

N. Ramanatha

TĀLAVĀDYA SEMINAR 1

Proceedings of
The Tālavādyā Seminar No. 1

Compiled and Edited by
Bangalore K. Venkataram

Published by
Karnataka Sangeetha Nrithya Academy
14/3, Canara Finance Corporation Building
Nrupathunga Road, Bangalore-560 002

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A collection of papers presented during the Talavadya Seminar No. 1
Organised by the Percussive Arts Centre under Joint Auspices with
Sangeet Natak Akademi, New Delhi and Financial Assistance of
Karnataka Sangeetha Nrithya Academy, Bangalore and Published by
The Registrar, Karnataka Sangeetha Nrithya Academy, Bangalore-560 002.

Proceedings of
The Talavadya Seminar No. 1

First edition: 1994

1K

Price: Rs.25/-

Compiled and Edited by
Bangalore N. Venkatesh

Published by

Composed in DTP by M/s. Use Comp, 66 Kaverappa Bldgs, 5th Cross,
Hosur Road, Wilson Garden, Bangalore-560 027 & Printed by
M/s. Navaneetha Press, 75, AaNaKru Road, Visveswarapuram,
Bangalore 560 004

General Editor's Note

The Karnataka Sangeetha Nrithya Academy has always reacted positively to the various activities in the music and dance field in Karnataka. Besides aiding the activities economically, the Academy lends its helping hand as co-sponsor too.

A unique two-day seminar on Tālavādyas was held under the joint auspices of the Academy and the Percussive Arts Centre. Many Scholars from within and outside Karnataka participated in the seminar and presented their invaluable views on the lesser known facts about the tālavādyas. The scholars put their ideas in black and white thus felicitating the publication work. I thank all of them.

In this compilation topics like "Physics of Indian Drums" (by Prof. B. S. Ramakrishana), "Tālavādyas" (K. S. Mahadevan), "Studies on Leather and Woods used in Drums" (N. Somanathan), among others make for an interesting reading. "Tālavādyas of Kerala" (L. S. Rajagopalan) and "Andhra" (Dr. B. Rajanikantharao) acquaint the readers with the peculiarities of regional drums. An article by Gurukrupa on "Konakol" brings into light its specialities. "Concept of Rhythm in Western Music" (G. Raj Narayan), "Glossary of Terms in the Percussive Art" (B. N. Sundaram), "Tālavādyā Tradition in Karnatak Music" (T. Shankaran) and the "Role of Tālavādyas in Carnatic and Hindusthani Music" (Shakuntala Narasimhan) open up new vistas in the field of percussives. "Valedictory Address" by R. K. Srikantan is all-comprehensive in understanding the importance and role of Tālavādyas in Carnatic Music.

As the subject dealt with is too technical and its great relevance to the music world as a whole beyond the regional barriers, it was rightly thought to print the papers in English for universal communication. Sri. Bangalore K. Venkataram needs to be thanked for his tidy compilation.

It is hoped that the readers would derive full benefit out of this compilation.

Dr. M. Suryaprasad
Chief Editor

A Word from THE PRESIDENT

Percussive Arts Centre has been working exclusively for the promotion of Percussive arts and perhaps the only such organisation of this kind in the country.

Among the several programmes attempted by this Art Centre, DOCUMENTATION of material on Percussion instruments - the art and the artistes, not available hitherto is a laudable project. Generation of data on various aspects like Historical, Textual, Scientific, Artistic and other areas has been the object of the Tālavādyā Seminars organised by the Art Centre.

The First such Seminar for which the Karnataka Sangeetha Nrithya Academy released a grant of Rs.3,000/- could bring out highly technical scientific aspects, which would be of exclusive use to scholars and serious students of music and musicological students. Several other interesting topics like the different Tālavādyā traditions of other States and useful material from the Proceedings of this Seminar have been compiled, duly edited and published.

It is hoped that this publication would be received with interest by all.

Pandit R.V. Seshadri Gawai
President

ಅಧ್ಯಕ್ಷರ ನುಡಿ

ತಾಳವಾದ್ಯ ಕಲಾಕೇಂದ್ರ-ಪರ್ಕಸ್ಸಿವ್ ಆರ್ಟ್ಸ್ ಸೆಂಟರ್ ಹಮ್ಮಿಕೊಂಡಿರುವ ಹಲವಾರು ಕಾರ್ಯಕ್ರಮಗಳಲ್ಲಿ ತಾಳವಾದ್ಯ ವಿಚಾರ ಗೋಷ್ಠಿಗಳು ಒಂದು ವಿಶೇಷ ರೀತಿಯ ಕೊಡುಗೆ. ಈವರೆಗೆ ದಾಖಲಾಗದ ಹಲವಾರು ಮಾಹಿತಿ ಈ ಪುಸ್ತಕದ ಮೂಲಕ ಬೆಳಕು ಕಾಣುತ್ತಿದೆ. ತಾಳವಾದ್ಯ-ಲಯ ವಾದ್ಯಗಳ ಬಗ್ಗೆ ಸಾಕಷ್ಟು ಲಿಖಿತ ಮಾಹಿತಿಗಳಿಲ್ಲದ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ಈ ವಿಚಾರ ಗೋಷ್ಠಿಗಳು ಈ ವಾದ್ಯಗಳ ಬಗ್ಗೆ ಮಾಹಿತಿ ಸಂಗ್ರಹಿಸಲು, ಸಂಗ್ರಹಿಸಿದ ಮಾಹಿತಿ ಮುಂದಿನ ಪೀಳಿಗೆಗೆ ಸಿಗುವಂತಾಗಲೂ ನೆರವಾಗುತ್ತಿದೆ.

ಚಾರಿತ್ರಿಕ, ಗ್ರಾಂಥಿಕ, ವೈಜ್ಞಾನಿಕ, ಕಲಾತ್ಮಕ ಮತ್ತು ದಾಖಲಿಸಬಹುದಾದ ಎಲ್ಲ ದೃಷ್ಟಿಗಳಿಂದ ವಿವಿಧ ಹಂತಗಳಲ್ಲಿ ಈ ಮಾಹಿತಿ ಸಂಗ್ರಹಣೆ, ದಾಖಲಾತಿ ನಡೆಯಬೇಕಾಗಿದೆ. ಈ ಯತ್ನದಲ್ಲಿ ಮೊದಲನೆಯ ವಿಚಾರಗೋಷ್ಠಿಗೆ ಕರ್ನಾಟಕ ಸಂಗೀತ ನೃತ್ಯ ಅಕಾಡೆಮಿ ರೂ. 3000/-ಗಳ ನೆರವನ್ನಿತ್ತು ಪ್ರೋತ್ಸಾಹ ನೀಡಿತು. ಈ ಗೋಷ್ಠಿಯಲ್ಲಿ ಮಂಡಿತವಾದ ವೈಜ್ಞಾನಿಕ ಪ್ರಬಂಧ, ತೀರ ತಾಂತ್ರಿಕ, ಇದನ್ನೂ ಹಾಗೆಯೇ ಉಳಿಸಿದಲ್ಲಿ ರಾಷ್ಟ್ರಾದ್ಯಂತ ತಜ್ಞರಿಗೆ ಉಪಯುಕ್ತವಾಗುವುದೆಂಬ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ಇದನ್ನು ಇಂಗ್ಲೀಷಿನಲ್ಲೇ ಪ್ರಕಟಿಸುವುದರ ಔಚಿತ್ಯ ಮನಗಂಡು ಮುಂದೆ ಇದರ ಅನುವಾದವನ್ನು ಕನ್ನಡದಲ್ಲಿ ಪ್ರಕಟಿಸುವ ಉದ್ದೇಶದಿಂದ ಈ ಪ್ರಕಟಣೆಯನ್ನು ಇಂಗ್ಲೀಷಿನಲ್ಲೇ ತಂದಿದೆ. ರಾಷ್ಟ್ರದ ವಿವಿಧ ಪ್ರಾಂತ್ಯಗಳ ತಾಳವಾದ್ಯಗಳ ಪರಿಚಯ, ಮಂಡಿತವಾದ ಉಪಯುಕ್ತ ಪ್ರಬಂಧಗಳನ್ನು ಪ್ರಕಟಿಸಿದೆ.

ಕಲಾಸಕ್ತರಿಗೆ ಇದರ ಉಪಯೋಗ ಆಗುವುದರಲ್ಲಿ ನಿಸ್ಸಂಶಯ. ಈ ಪ್ರಕಟಣೆ ಹೊರತರಲು ನಮಗೆ ತುಂಬ ಸಂತೋಷ, ಹೆಮ್ಮೆ.

ಪಂ|| ಆರ್. ಎ. ಶೇಷಾದ್ರಿ ಗವಾಯಿ
ಅಧ್ಯಕ್ಷರು

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PREFACE

The musical tree in India has two basic divisions - Rāga and Tāla, while rāga governs its melodic element, tāla helps to maintain the balance.

Rāga is generally described as the soul of Indian Music - Hindustani and Carnatic. Tāla which is independent of melody, is the very pulse of the system.

Yet tāla has not received as much attention on the academic level. It is to fill this lacunae that the Percussive Arts Centre was founded. In a short span of about 10 years, the Centre which is only one of its kind in the country, has done pioneering work in creating awareness on the various aspects of the system as also the characteristics of the different percussion instruments or Tālavādyas. In this connection, it has periodically held seminars, workshops, study circles besides conducting research on the subject.

A two-day seminar on Tālavādyas held in Bangalore recently was one such activity. The voluminous literature that has resulted in this interesting seminar bears eloquent testimony to the stimulating discussions that were generated in it. The treatment in each paper by well-known scholars in the field is exhaustive and may well form the basic approach for further research and dissemination. To say that a study of this vast subject is a must, for a student of music could be an understatement.

It is worthwhile, nay very desirable that these papers are published and made available to discerning scholars in the field.

It is only in the fitness of things that the State Sangeeta Nrithya Academy has undertaken to publish the papers in a volume. There is no doubt that it will go a long way in creating awareness among students of music.

S.N. Chandrasekhar

SEMINAR-1 ON TALA VADYAS

An interesting erudite two-day seminar was held at Bangalore under the auspices of the Percussive Arts Centre at the Gokhale Institute of Public Affairs, on the 23rd and 24th February 1992. Inaugurating the seminar, Dr V. Doreswamy Iyengar explained the necessity of such seminars to throw light on several technical scientific and artistic aspects of this highly intricate art form. Iyengar complimented the Art Centre in organising such academic activities and documenting them for posterity. Justice Nittoor Sreenivasa Rau, the President of the Art Centre felicitated Pandit R.V. Seshadri Gawai on his assumption of office as Chairman of the Karnataka Sangeetha Nrithya Academy. Prof R. Sathyanarayana of Mysore delivered the key-note address.

In his paper Sri K.S. Mahadevan recalled the reputed talavadya artistes of yester-years and made a fervant appeal to resuscitate the art of 'Konnakkol'. Sri T.V. Gopalkrishnan, the Seminar Director, gave a delightful vocal recital in the efficient company of young H.K. Venkataram on violin, experienced Sri A.V. Anand and the young Anoor Ananthakrishna Sharma on double mrudangams and presented a pallavi in the infrequent 'Kokilapriya' thala with a Guru, Laghu and Plutha of 24 counts per avartha.

Dr B.S. Ramakrishna, in his paper illustrated with slides, explained the experimental results of frequencies of modes of vibrations of Mrudanga and Thabla. Two young artistes N. Vasudeva and Rangantaha Chakravarthy presented an excellent Laya Vinyasa on Mrudanga and Ghata in Misra Triputa thala of the infrequent 11 counts to a bar and provided highly pleasant accurate display with 'karappu' and melodic patterns of 'mukthayee'.

Dr B. Rajanikantha Rao from Vijayawada in his paper on "Talavadyas of Andhra" profusely illustrated with excerpts of recordings, explained a variety of drums and also the regional character of the vadyas of Andhra and recalled the International Award, Akashvani Vijayawada got a couple of years back by presenting a programme on LAYA with various folk percussion instruments. Smt. Sakuntala Narasimhan in her presentation of the "Role of Laya/Tala vadyas in the Karnataka and Hindustani styles" demonstrated in unequivocal terms the place of mrudanga and tabla in the relevant systems and their utility, assisted by Sri V.S. Rajagopal on mrudanga and Sri Ravindra Yavgal on Tabla. The well known mrudangist and all rounder Sri T.V. Gopalkrishnan narrated the recent innovations done in separating the two drum-heads of mrudanga for easier maneuverability and the use of Teflon material in place of the conventional skins.

A paper by Sri T. Sankaran presented the "Karnataka Talavadya Tradition" while Sri L.S. Rajagopalan of Trichur in his paper on the "Talavadyas of Kerala" narrated the different instruments used in the variety of ensembles and explained their time factors and usage in tradition and the folk rhythms. A paper on Konnakkol was presented by Sri Gurukrupa while Sri G. Rajanarayan illustrated his paper on the "Concept of Rhythm in Western Music" with several classical musical recordings. Sri B.M. Sundaram presented two papers, on the "Evolution of Thani" and some items on the Glossary of technical terms used in percussive arts. Sri R.K. Srikantan in his valedictory address complimented the Art Centre on their ventures of the type held and stressed the importance of scientific and artistic study of these art forms for better understanding by artistes and scholars.

The concluding percussion ensemble lead by Sri T.V. Gopalkrishnan on mrudanga, Sri Bangalore K. Venkataram on Konagolu, Sri M.A. Krishnamurthy on ghata, Sri Ananthakrishna Sharma on Dolu and Sri Rajasekhar on Morching exhibited that such exclusive percussion interludes also sustain the intelligent listeners as well as the general public.

The seminar was held under the courtesy of the Central Sangeet Natak Akademi and the Karnataka Sangeetha Nrithya Academy. While the Question-Answer session was conspicuously absent for want of time, special items like the key-note address by an acknowledged scholar could have been more specific in throwing better light on the Talavadyas of Karnataka instead of just explaining the agenda. Abstracts of papers could also have been made available for the listeners. While the outcome of the seminar was definitely utility oriented, the proceedings and the papers when published, would be useful for students and scholars interested in further research on these aspects.

Further seminars on the topic on several other instruments like Ghata, Kanjira, Dolu etc would surely draw more responsive audience and serve the contemporary scene better.

It was good to see that this purely dry highly technical seminar drew fairly good audience, which is good augury for the cultural scene especially for the Percussion side.

PHYSICS OF INDIAN DRUMS: Mridangam and Thabala*

Prof. B.S. Ramakrishna

Drums belong to a class of instruments called percussion instruments which are again subdivided into idiophones and membranophones. Idiophones are distinguished by the fact that the whole body of the instrument vibrates in producing its characteristic sound. Examples are bells, cymbals, xylophones, ghatam and even the musical pillars found in some of the temples of South India. Membranophones, on the other hand, produce their sounds by the vibration of a membrane, usually a specially prepared leather, stretched over an opening of the supporting body or vessel which itself does not partake in the vibration. The mridangam and thabala, including its companion drum dugga (or bayan or simply left-hand thabala), belong to the subdivision of membranophones.

Drums are found in all parts of the world and are amongst the oldest instruments. They are used for a variety of purposes, as accompanying instruments to music and dance, for performing certain ceremonial rites and even for communicating messages. The antiquity and ubiquitous nature of the drums arise from the fact that it is relatively easy to construct one with readily available materials and that the drum can produce loud sounds that can carry far. The mridangam appears in Ajanta cave paintings and its antiquity can be traced as far back as the Vedic times. Some writers on Indian music seem to think that there is evidence of a form of this drum in the Harappan civilization. The thabala on the other hand seems to have reached India with the Moslems. Whatever the origin and antiquity of the Indian drums, the mridangam and thabala stand unique among all the drums in the world, being the only ones that possess harmonic overtones, i.e., to say, partials whose frequencies are in the ratio of 1:2:3, etc. When a note contains partials whose frequencies are in the ratio of integers 1, 2, 3 etc, the ear is pleased with it and we say the note is musical. The credit for discovering the harmonic character of the overtones of mridangam and thabala goes to C.V. Raman,¹ who first observed in 1920 that these drums have at least four harmonic overtones. Some years later he conducted further experiments² and identified the modes of vibration of the drums which produce the harmonic overtones.

* Also spelled mrdanga and tabla respectively.

To appreciate the significance of this property of the Indian drums, mridangam and thabala, it may be pointed out that among all the instruments used for making music, it is only the stretched strings and vibrating wind columns that can produce harmonic overtones. Musical instruments whose overtones do not form a harmonic sequence have never attained the eminence of string and wind instruments. They have been relegated to the role of marking time intervals, i.e., of making rhythm. With the exception of mridangam and thabala, no other drum has found a place in Indian classical music, similar to them.

Characteristic Modes of Vibration and their Frequencies

Before we go deep into the physics of mridangam and thabala it pays to take a closer look at the vibration characteristics of stretched strings. The basic concepts of vibration phenomena are easier to comprehend in the case of strings (which have only one dimension) than in the case of drumheads (which have two dimensions). A stretched string held fixed at two points can vibrate freely in any one of the shapes or patterns shown in Fig.1. It can vibrate between the two extreme positions shown at the top and bottom of Fig.1(a), all points of the string moving in unison. This pattern of vibration in which no point of the string is ever at rest (except the two end points) is said

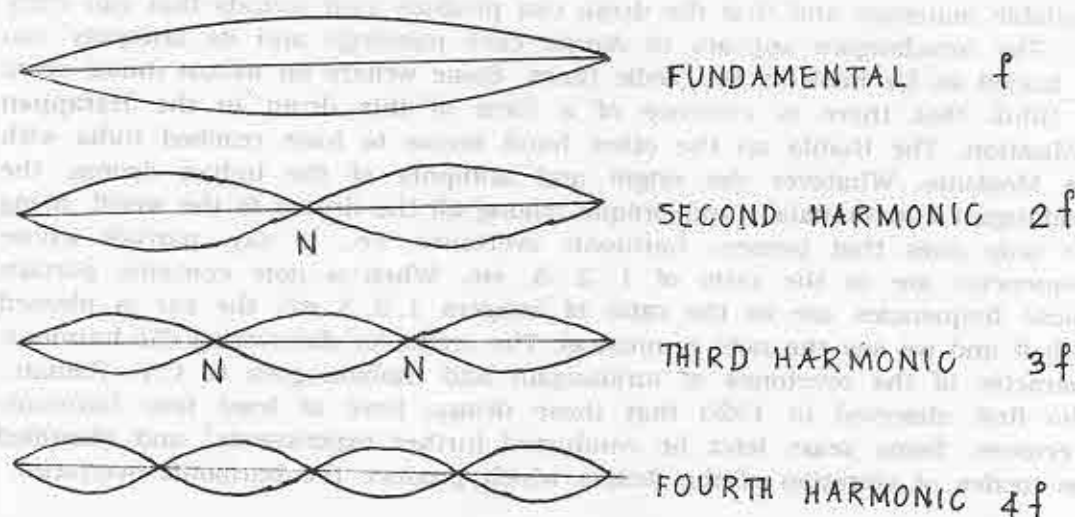


FIG.1
CHARACTERISTIC MODES OF VIBRATION OF A STRETCHED STRING HELD FIXED AT BOTH ENDS. THE FREQUENCIES OF THESE MODES OF VIBRATION ARE IN THE RATIOS OF THE INTEGERS 1:2:3 ETC., AND HENCE ARE SAID TO FORM A HARMONIC SEQUENCE.

to be the fundamental mode of vibration and the frequency with which it vibrates is said to be of a given length, the fundamental frequency depends upon its tension and mass per unit length. The same string held fixed at the same two points can also be made to vibrate in two, three or more loops as in Figs.1(b), (c) and (d) in which one, two or more points (marked N) remain at rest while the rest of the string vibrates. These points are called nodes. When the string vibrates in two loops it does so at twice the frequency of the fundamental mode of vibration and when it vibrates in three loops it does so at thrice the frequency of the fundamental and so on. The different patterns of vibration are called the characteristic modes of vibration and their frequencies are called the characteristic frequencies, because they characterize the string as a vibrating body. For a string the characteristic frequencies happen to be in the ratio $1:2:3$, etc., thus forming a harmonic sequence whatever the tension may be. The string need not vibrate exclusively in any one of these modes. In fact, if it is bowed or plucked at a point, it vibrates in a triangular shape. According to a powerful theorem in mathematics due to Fourier, any arbitrary shape can be built up by superposing the characteristic modes of vibration shown in Fig.1 in different proportions. But since the overtones are always harmonic, the string note is always pleasing. It is this property of strings, viz., that every possible shape of vibration of the string is composed of characteristic modes of vibration whose frequencies are in the ratio of $1:2:3$, etc., that makes the strings preeminently suited for making musical instruments.

Now how does a stretched membrane like that of an ordinary drum vibrate and what are its characteristic modes of vibration and their frequencies? A circular drumhead can vibrate in any of the modes sketched in Fig.2 shown on next page. In its fundamental mode of vibration, the entire drumhead moves up and down as in Fig.2(a), all points of the drumhead moving in unison except, of course, those at the periphery which are constrained to remain stationary. There are no nodal points. The drumhead can also vibrate in the shape shown in Fig.2(b), in which a diameter of the drumhead always remains at rest. This diameter is called a nodal line or, more specifically, a nodal diameter. The parts of the drumhead on opposite sides of the nodal diameter vibrate in opposite phase, i.e., to say, the corresponding points of the drumhead on opposite sides of the nodal diameter would have at any instant the same magnitude of displacement but would be moving in opposite directions. The frequency of this mode of vibration is 1.59 times that of the fundamental. The drumhead can also vibrate with a nodal circle concentric with the (fixed) periphery of the drumhead as shown in Fig.2(c). Again the parts of the drumhead on opposite sides of the nodal circle would be moving in opposite directions. Thus while the central region would be moving up the annular region between the nodal circle and the periphery would be moving down and vice versa. The frequency of this mode of vibration is 2.40 times that of the fundamental. There are many more characteristic modes of vibration for uniform circular membrane. The characteristic modes of vibration are distinguished by the nodal diameters

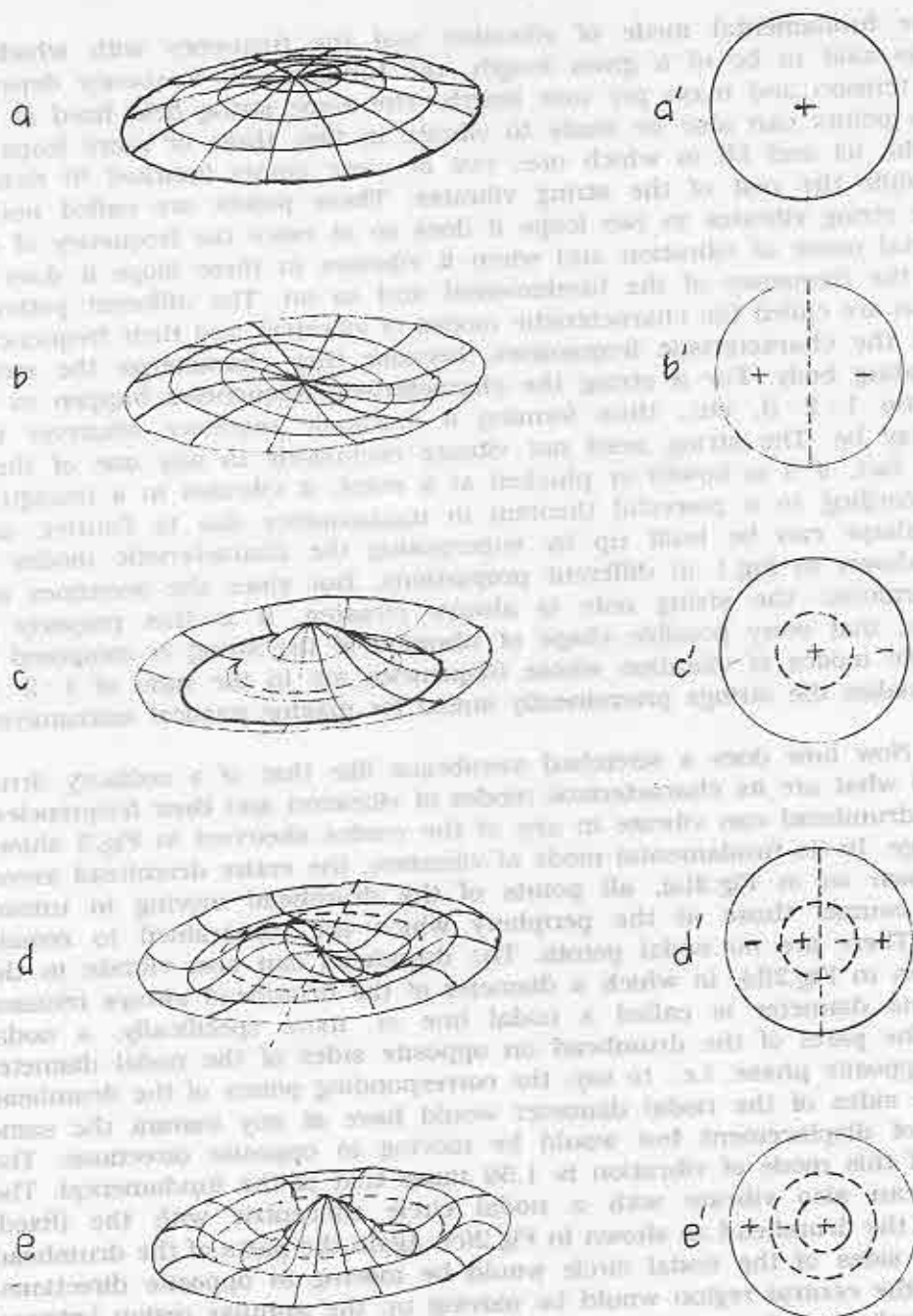


FIG. 2

CHARACTERISTIC MODES OF VIBRATION OF UNIFORM CIRCULAR MEMBRANE. FIGURES (a)-(e) SHOW THE SHAPES OF VIBRATION OF THE MEMBRANE WHICH GIVE THE FIVE LOWEST FREQUENCIES. FIGURES (a')-(e') ARE SIMPLIFIED REPRESENTATIONS OF THE MODES BY THEIR NODAL PATTERNS WHERE THE + AND - SIGNS DENOTE CRESTS AND TROUGHS.

and the nodal circles that characterize their patterns of vibrations. Since it is cumbersome to refer to each characteristic mode by its pictorial representation, we will denote them by means of an equivalent symbolic representation as in Fig.2(b'), (c'), etc. The plus and minus signs indicate that the parts of the drumhead on opposite sides of (any) nodal line move in opposite directions at any time. Again, the importance of the characteristic modes of vibration lies in the fact that any arbitrary displacement of the drumhead (such as the shape into which it is deformed when struck at a point) can be represented in terms of the characteristic modes of vibration. Finally, we notice that, unlike in the case of stretched string, the frequencies of vibration of the characteristic modes of a uniform stretched membrane, given in Col 2 of Table 1, do not form a harmonic sequence. Thus the note from a uniform stretched membrane such as that of a kanjera is not musical.

Table 1.

Frequency ratios of characteristic modes of right hand thabala.

Mode of Vibration	Uniform membrane ^a	Composite membrane ^a	Thabala in normal use ^b	Same thabala back opened ^b
	1.00	1.00	1.10	1.03
	1.59	1.94	2.00	2.00
	2.40	3.06	3.00	3.00
	2.14	2.95	3.00	3.00
	2.92	4.10	4.01	4.00
	2.65	3.97	4.03	4.00
	3.60	4.83	5.11	5.04
	3.50	5.15	5.07	5.08
	3.16	4.96	5.07	5.03

a. Frequency ratios calculated with respect to fundamental taken equal to 1.

b. Measured frequency ratios with respect to second harmonic taken equal to 2.

Mridangam and Thabla

The mridangam and thabala are unique among all the drums in having specially loaded drumheads. Though a description of the construction of these drums is superfluous to the musician, for the sake of completeness and for the reader who is not familiar with the drums, a brief sketch is given here of the drums and their drumheads. The mridangam shown in Fig.3 (along with the right and left hand thabalas) consists of a cylindrical barrel shaped wooden shell about 2 ft in length and about 6-9 inches in diameter at its narrowest and widest sections. The taper of the shell is fairly small and is presumably intended to make it fit snugly between the drummer's legs as he sits on the floor with folded legs. It appears to have no acoustical significance. Its two (otherwise) open ends are covered with leather heads (said to be of calf or buffalo skin) which are reinforced by two annular flaps, one on either side of the drumhead. The flaps (which do not adhere to the main drumhead) were probably originally meant to protect the drumhead from tearing when it is stretched over the edge of the wooden shell but, as will be seen presently, they also happen to affect the tone quality of the drums profoundly. A braided leather thong passes through closely spaced holes along a circle of slightly larger diameter than the outer edge of the shell and serves to apply tension to the drumhead radially in all directions. A long leather thong passes back and forth 16 times between the braids of the drumheads at the two ends. The tension in the drumheads can be increased or decreased by positioning suitably 8 wooden pegs held between the leather thong and the wooden shell. Fine timing of the drumhead to equalize the tension in all directions is done by hammering lightly on the edge of the drumhead with a small hammer at appropriate points in an upward or downward direction. In the mridangam the right righthand drumhead is slightly smaller than the other. It is loaded at the centre in a concentric circle of radius slightly less than half the radius of the drumhead with a black paste said to be of charcoal, starch and gum mixed with fine dust of iron or manganese oxide powder. In practice, the paste is applied in several layers of decreasing radii until the tone given by the drum sounds right to the drummer's ears. At each stage of application of the paste, it is allowed to dry and is smoothened with a polished stone. The paste develops fine cracks on the surface as it dries up, but it adheres firmly to the drumhead and remains quite flexible so that the drum head can be still regarded as a membrane according to the physicist's definition.

Acoustically, the right and left-hand thabalas together constitute the equivalent of mridangam. The right-hand thabala consists of a truncated conical wooden shell with a small taper. The shell measures, on the outside, about 6 inches or slightly less at the top where it is open and about 7-8 inches at the bottom where it is closed. The height of the thabala is about 10-11 inches. The drumhead which spans the open end is loaded at the centre in a symmetric manner in much the same manner as the loaded drumhead of the mridangam.

The tensioning of the drumhead is also done in the same way by means of a leather thong that is stretched between the leather hoop at the top and a circular loop at the bottom. In some more recent versions of the thabala, however, metal rods with wing nuts are used for applying the tension. The left-hand thabala, sometimes called dugga or bayan, is somewhat larger in size and has a metal shell. The drumhead measures about 9 inches in diameter and, unlike in the case of the righthand Thabala, is loaded eccentrically as shown in Fig.3. Tension in the drumhead is controlled by means of a leather thong as in the case of the right-hand thabala.

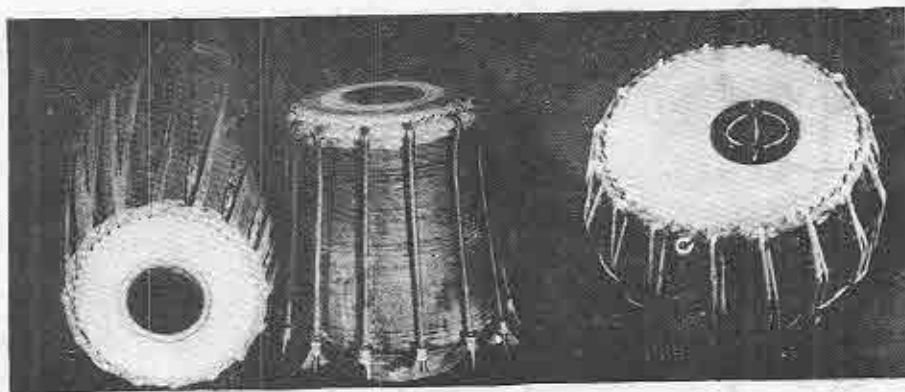


FIG.3
PHOTOGRAPHS OF MRIDANGAM (RIGHT-HAND), THABALA AND LEFT-HAND THABALA OR DUGGA (IN THAT ORDER).

Characteristic Modes of Vibration of Mridangam and Thabala

As the drumheads of mridangam and righthand thabala are entirely similar in their construction, their vibration characteristics are also similar. Their tone qualities, which depend upon the relative strengths of the different harmonics, however, differ. In the following analysis, the discussion and photographic patterns given for the right hand thabala also apply to the loaded drumhead of the mridangam. The lefthand thabala will be dealt with separately.

The characteristic modes of vibration of mridangam and thabala shown in Fig.4 next page, are entirely similar to those of the ordinary drums with circular membranes as one might expect an account of the circular symmetry of the drumhead. What makes the drumheads unique is that the loading of the drumheads has neatly reordered the frequencies of the same characteristic modes into groups which have harmonic or near harmonic overtones, thereby bestowing a musical quality to the sound of these drumheads. Theoretical analysis of the vibration by the author³ and M.M. Sondhi shows that when the drumhead is loaded to a distance of about $4/10$ of its radius

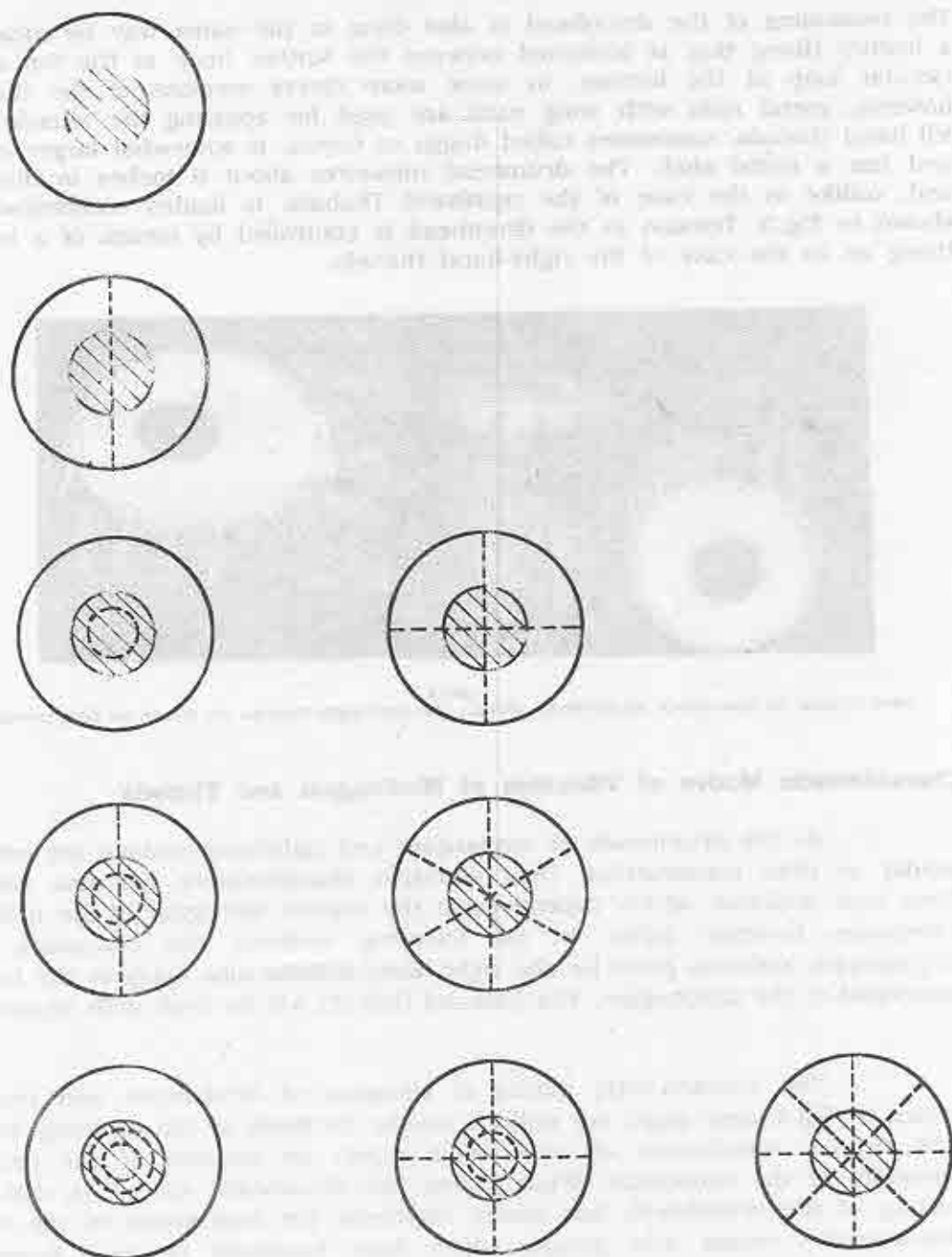


FIG.4

DOTTED LINES SHOW NODAL LINES OF IDEAL COMPOSITE MEMBRANE FOR THE LOWEST NINE MODES OF VIBRATION. VARIOUS MODES ARE ARRANGED IN DIFFERENT ROWS ACCORDING TO THE HARMONIC TO WHICH THEY CORRESPOND. CROSS HATCHING SHOWS LOADED REGION OF DRUM-HEAD.

to a surface density of about 10 times that of the unloaded region, the frequency ratios of the different modes become almost harmonic. Column 2 of Table 1 shows the calculated frequencies of different modes for an ideal composite membrane of the above description.

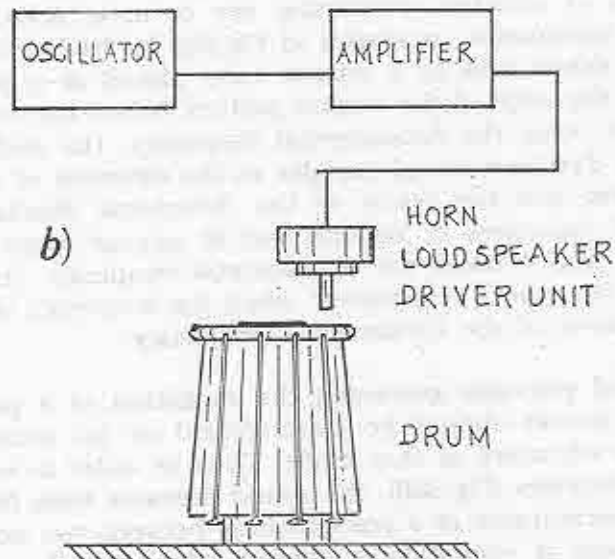
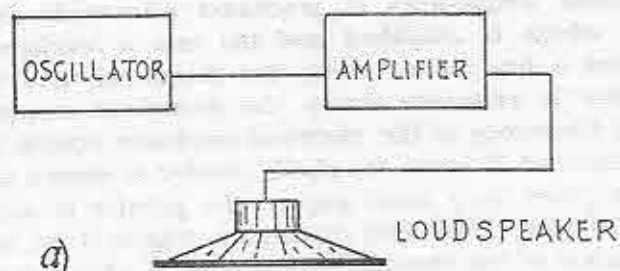


FIG. 5

- (a) EXPERIMENTAL SETUP FOR OBTAINING NODAL PATTERNS WHICH HAVE CIRCULAR SYMMETRY
 (b) EXPERIMENTAL SETUP FOR OBTAINING PATTERNS CONTAINING ONE OR MORE NODAL DIAMETERS

So far nothing has been said about how the characteristic modes of vibration of a drum may be excited. The experimental setup shown in Fig.5 may be used to excite each of the characteristic modes. It is based on the principle of resonance which states that when a sound of the same frequency as the natural frequency of a vibrating object is produced in its vicinity, the object will pickup the energy from the sound and vibrate vigorously. Here the sound of the required frequencies is produced electrically by means of an electrical oscillator, which is amplified and fed into a loudspeaker. When the loudspeaker is placed a few inches above the drumhead and the frequency of the electrical oscillator is increased slowly, the drumhead responds by vibrating vigorously when the frequency of the electrical oscillator equals the fundamental frequency of the drumhead. If some dry chalk powder is strewn on the drumhead (by rubbing a chalk piece on a sand paper), the powder is seen to be thrown up and to fall back on the drumhead repeatedly. Figure 6, in next page, shows the photographs of some of the characteristic modes of vibration of the drumhead obtained in this way as the frequency of the oscillator is varied from the fundamental frequency of the drumhead through its overtones. Figure 6(c) appears, for instance, when the frequency of the oscillator is near about the third harmonic and 6(g) near the fifth harmonic.

The other figures in which a nodal diameter appears are not normally excited by the above setup if the tension in the drumhead has been made perfectly uniform because there is no reason why a nodal diameter should form in one direction rather than in another under perfectly symmetric excitation. To excite the modes of vibration containing one or more nodal diameters we make the excitation asymmetric as shown in Fig.5(b) by feeding the sound from a horn loudspeaker driver unit to a narrow tube placed at a point above the drumhead and near the edge of the loaded portion. When the frequency of the sound is near about twice the fundamental frequency, the nodal diameter of Fig.6(b) appears in a direction at right angles to the direction of the line joining the point of excitation and the centre of the drumhead. Similarly, the nodal patterns of 2 and 3 diameters of Fig.6(d) and (f) appear when the frequency of the oscillator is 3 and 4 times the fundamental frequency, respectively. The patterns of 6(e) and (h) appear respectively when the frequency of the oscillator is nearly 4 and 5 times of the fundamental frequency.

The general principle governing the excitation of a particular mode is that the exciting sound should be concentrated at an antinode (i.e., the position of maximum vibration) of that mode. Thus in order to excite the third harmonic with two diameters (Fig.5(d)), the sound pressure from the loudspeaker of Fig.5(b) must be concentrated at a point midway between two nodal diameters, or rather, when a point of excitation is chosen arbitrarily, the adjacent nodal diameters will form symmetrically with respect to the point of excitation. Even so, one must carefully select the point of excitation for, as there are two modes of vibration with nearly the same frequency, viz., the mode with one circle,

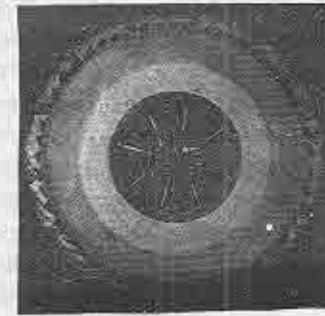
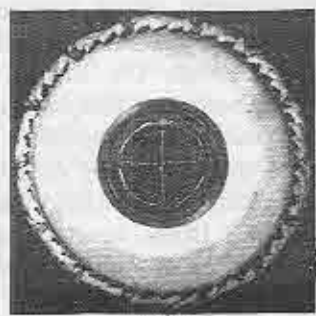
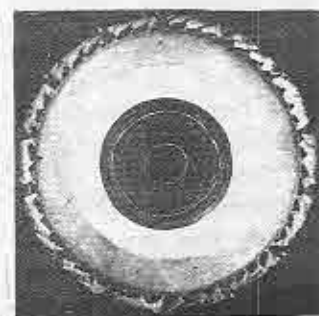
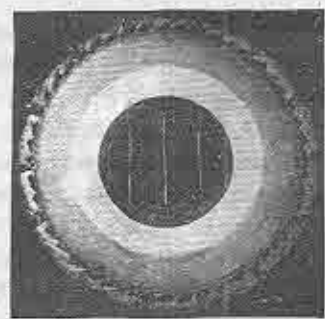
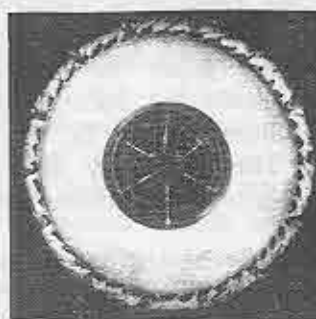
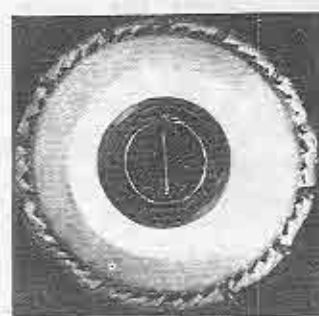
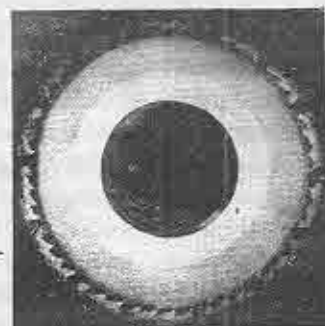
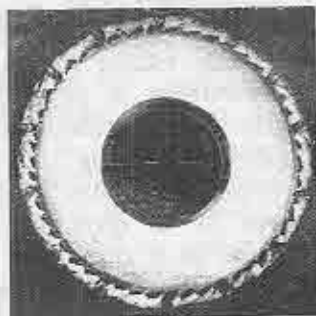
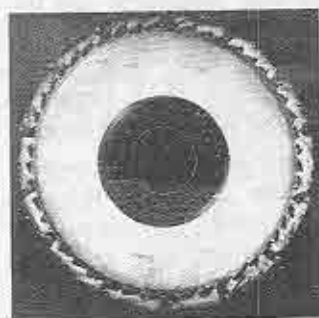
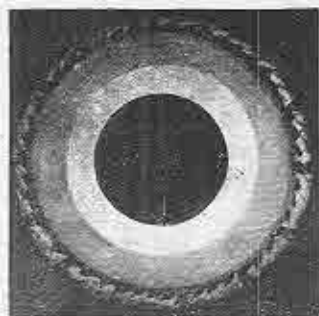


FIG.6
PHOTOGRAPHS OF CHARACTERISTIC MODES OF VIBRATION OF THABALA AND ALSO OF MRIDANGAM.

Fig.6(c), and the mode with two diameters, Fig.6(d) both of them tend to appear together leading to a pattern like that of Fig.6(j) or some variant of it. In order to completely suppress the mode with the nodal circle, Fig.6(c), the point of excitation should be located on this circle itself so that the mode with one nodal circle cannot appear since the driven point cannot be at rest. Thus the principle enunciated must be enlarged by the additional requirement that when there are two or more modes with nearly the same frequency, as in Fig.6(c) and (d) or 6(e) and (f), or 6(g), (h) and (i), the point of excitation for a desired mode must be near its antinode and on the nodal line of the mode that needs to be suppressed. Figs.6(c)-(i) are obtained in this manner. Finally a note of caution: First the tension in the drumhead must be carefully adjusted to be the same in all directions. The drummer does this by tapping the drumhead of the thabala with the first finger while letting the ring finger rest at a point on the drumhead. This mode of excitation is precisely the one that favours the excitation of the second harmonic with the modal diameter passing through the point touched by the ring finger. By turning the drumhead, the drummer excites the nodal diameter in different directions and listens to the pitch in each case. If the tension is uniform in all directions, the pitch remains the same as the drum is turned around. If it does not, he adjusts the tension (by hitting the edge of the drum with a small hammer) until the pitch is the same for all directions. The same result can be achieved also by exciting the drum to form a nodal circle. If the tension is grossly non-uniform, the circle may not be formed at all and the tension should be adjusted by pulling the straps while the drum is resonating under the loudspeaker to feel in which direction the tension must be increased (or decreased) to get a near-circle or an ellipse. Once the ellipse is obtained it can be made into a good circle by slight adjustment of the tension. The frequency of the oscillator should also be adjusted to maintain full resonance throughout the adjustment.

The frequency of any mode of oscillation is determined by reading (or measuring) the frequency of the electrical oscillator when the drumhead is vibrating in the mode. The frequencies thus obtained for a thabala are given in Col.3 of Table 1. Only the frequency ratios for the various modes taken with respect to the second harmonic as 2 (rather than the actual frequencies) are given. It will be recalled that although the actual frequencies increase as the tension in the drumhead is increased, the frequency ratios remain constant. It is seen from Col.2 of Table 1 that the composite membrane represents a reasonably good mathematical model of the actual drumhead and predicts near harmonicity of just the modes that Raman identified as producing the different harmonics. Actually Raman² excited all these modes by tapping the drumhead at the antinodes and restraining the motion of the drumhead by gentle constraints applied at suitable points with his finger tips. When he first discovered the harmonic character of these drums, electronic oscillators or frequency analyzers were not available commercially and he had only his keen ear to rely upon.

Notice that the overtones of the drum itself exhibit better harmonicity than the mathematical model indicates except that the lowest or fundamental frequency is about 10% higher than what it should be. T.D. Rossing and W.A. Sykes who measured the frequencies of the various overtones under normal playing conditions of the drum also found the same sort of discrepancy could occur in the fundamental frequency. According to the composite membrane idealization of the drumhead, the discrepancy in the frequency of the fundamental should not be more than about 3%. Then how does this single flaw come about in an otherwise perfect design? To find the answer we must look not into the drumhead but into the air enclosed below the drumhead in the shell. In the fundamental mode of vibration, when the drumhead moves downwards (i.e., inwards), the air in the shell undergoes compression and when the drumhead moves upwards, the air undergoes rarefaction. In either case it acts like a spring and thereby effectively increases the tension. The result is that the drumhead vibrates with a higher frequency than it would if the air below it were not confined. In the mode of vibration with one nodal diameter, the second harmonic, the situation is different. In this case while one half of the drum is going up, the other half is going down by exactly the same amount so that there is no net change in the volume of the enclosed air. Thus the enclosed air has no effect on the second harmonic. Similar remarks apply to the other modes of vibration which have two or more diameters. Even the modes of vibration with one nodal circle producing the third harmonic or the mode with two nodal circles producing the fifth harmonic are affected only slightly as the net change in the volume of the air is marginal. In Col.4 of Table 1 are presented the frequency ratios of the various modes of the thabala measured with the bottom of the shell opened to the surrounding air thus reducing the spring effect to almost zero. The frequency ratios including those of the fundamental are now much closer to a true harmonic sequence.

The question now is, in the normal mode of playing the thabala with the air trapped behind the drumhead in the wooden shell, how does the drummer overcome the problem of the incompatible fundamental? The drummer is still the master of the situation. The playing technique is such that the fundamental is rarely excited in full strength. There is a remarkable property of the ear that when it is supplied with the second, third, etc, harmonics of a tone, it perceives the difference tone between these frequencies (which equals the fundamental) and finds them harmonic with respect to the fundamental although it is physically absent in the complex sound produced.

The increase that takes place in the fundamental frequency of a stretched drumhead when backed by a cavity is called the kettle drum effect. It occurs in mridangam also though not to the same extent as in the tabala because the volume of the air enclosed in the mridangam wooden shell is much larger. If the air enclosed behind has a detrimental effect on the tone quality, why then should drums have closed shells? Simply because the enclosed

air sustains the vibration for a much longer period than would be the case if the back of the drumhead were to be open, as for instance with the drums tom-tom, kanjera etc. Even the mass loading of the drumhead which is primarily responsible for making the overtones into a harmonic sequence might have been first introduced because it too prolongs the tone. A tone must be sustained for a long enough time if it is to evoke the sensation of pitch so essential for a musical note. The loading, of course, can be made in such a way that the second, third, etc. Overtones are harmonic with respect to the fundamental of the air cavity backed drumhead. M.M. Sondhi⁵ has, in fact, worked out the density of the mass loading that precisely does this. But this requires finer control over the loading of the drumhead and is difficult to achieve practically without instrumental aids.

Left-hand Thabala

Before leaving the subject of the characteristic modes of vibration, a few words must be said of the left-hand thabala which presents a more challenging problem to the analyst who wants to determine its characteristic modes and the frequencies of their vibration. Unlike in the case of the right-hand

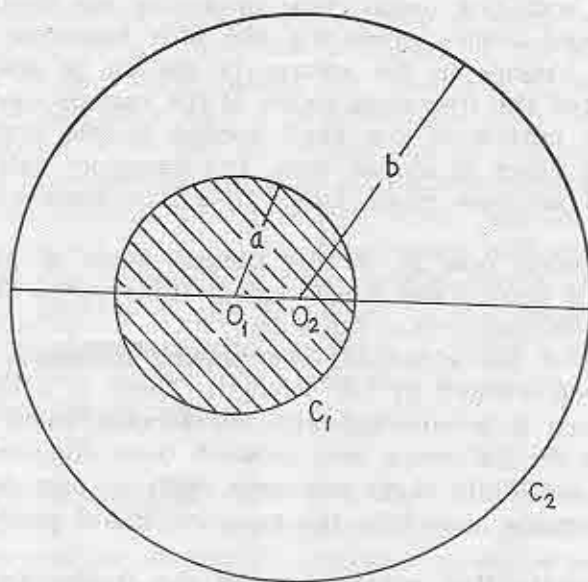


FIG. 7
MATHEMATICAL IDEALIZATION OF LEFT-HAND THABALA DRUM-HEAD WITH CENTRES O_1 AND O_2 FOR THE LOADED AND UNLOADED REGIONS

thabala, the loading in the case of the left-hand thabala is eccentric as shown in Fig.7. The difficulty here is that—as the mathematician puts it—the problem is not separable, i.e., to say, he cannot have one set of equations for the variation of the vibration amplitude along the radial direction and a separate set of equations for the variation along the circumferential direction.

The problem was, however, tackled rigorously by T. Sarojini⁶ and A. Rahman who wrote the equations in coordinate system called the bipolar coordinates in such a way that when the eccentricity is reduced to zero (i.e., as the loaded patch is moved to the centre of the drumhead), the equations represent the vibrations of the (symmetrically loaded) righthand thabala. As this analysis does not lend to a non-mathematical description, we would present

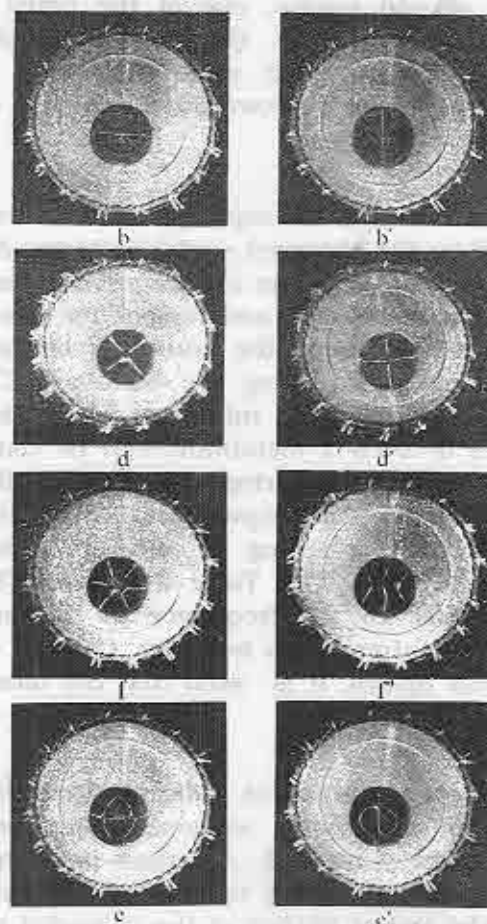


FIG. 8

PHOTOGRAPHS OF CHARACTERISTIC MODES OF VIBRATION OF LEFT-HAND THABALA OR DUGGA. (b), (d), (f) AND (e) ARE EVEN MODES WHILE (b'), (d'), (f') AND (e') ARE ODD MODES.

here a more intuitive approach developed by the author.⁷ An examination of the vibration pattern of the left-hand thabala drumhead given in Fig.8 reveals that its characteristic modes of vibration are perturbed versions of those of the right-hand thabala, the circles of the right-hand thabala becoming slightly elliptical and the diameters slightly curved. There is also another difference; since the loading is eccentric, the circular symmetry obtained in the righthand thabala disappears here. The line of centers $O_1 O_2$ of Fig.7, serves as a reference direction to distinguish between two sets of modes which may be called (for mathematical reasons) even and odd modes - a distinction which has no relevance in the case of the symmetrically loaded righthand thabala drumhead. The even modes are those for which no nodal diameter coincides with the line of centres; the nodal diameters make equal angles with the line of centres. On the otherhand, in the case of odd modes, one of the nodal diameters coincides with the line of centres. Furthermore, the frequencies of the even and odd modes of any pair differ slightly, the odd ones being slightly higher. The difference approaches zero as we go towards the higher order modes as can be seen from Table 2, in next page.

The above results may be explained on the basis of the following physical model suggested by the observed modal patterns. As most of the energy of vibration lies in the loaded part of the membrane, we disregard the vibrations of the surrounding annular membrane and replace its effect on the loaded part by an equivalent spring acting along the boundary of the loaded region. The stiffness of this, of course, varies along the boundary C_1 , being a maximum where the annulus is narrowest and a minimum where the annulus is widest. The vibration frequencies of such a membrane can be computed from those of a similar membrane but held by a spring of uniform stiffness by a technique known as perturbation method. The frequency ratios calculated in this manner for a membrane supported by a spring of constant stiffness and of variable stiffness are given in Cols.1 and 2 of Table 2. Column 3 gives the frequency ratios of the modes relative to the frequency of the mode with one nodal diameter along the line of centres taken as unity. Column 4 gives the measured frequencies of the different modes. It is seen that the measured and calculated values agree to within 7% or better.

Neither theory nor experiment indicates that the frequency ratios of the lefthand thabala form a harmonic sequence. The question then arises as to how these drums can be combined. Attention must be now drawn to the fact that in the usual mode of playing this drum, the drummer has the edge of his palm pressed on the widest portion of the unloaded part of the drumhead. Thereby he applies a certain constraint and effectively shortens the width of the annular portion in this region and the drumhead tends to behave more like a symmetrically loaded one. That a symmetrically loaded membrane can

produce harmonic overtones under suitable conditions has now been amply demonstrated.

Table 2. Frequency ratios of characteristic modes of left hand thabala.

Mode of Vibration	Symmetrically loaded membrane ^a	Eccentrically loaded membrane ^a	Ratios for eccentrically loaded normal ^b	Ratios for left handed thabala ^b
	1.01	1.01	0.49	0.54 ± 0.02
	2.05	2.02	0.97	0.95 ± 0.02
	2.05	2.08	1.00	1.00 ± 0.02
	3.06	3.04	1.46	1.52 ± 0.02
	3.06	3.06	1.47	1.54 ± 0.02
	3.58	3.58	1.72	1.75 ± 0.05
	4.04	4.03	1.94	2.06 ± 0.05
	4.04	4.05	1.95	2.10 ± 0.05
	4.87	4.86	2.34	2.32 ± 0.05
	4.87	4.88	2.35	2.36 ± 0.05

a. Calculated values on the basis of the model described here.

b. Frequency ratios relative to that of the mode with one diameter along the line of centres.

Total Quality of the Drums

From the musical point the intensity ratios of the various overtones of a musical instrument are only next in order of importance to their frequency ratios. The relative intensities of the overtones produced by the drums depend upon how the drum is struck and thus are largely under the drummers' control and can vary considerably. For instance, if the drumhead is struck over a

large area at the centre, it is mainly the fundamental and, to a small extent, the third harmonic with the modal circle that are excited. On the other hand, if the drum is tapped with the first finger off the centre while the ring finger rests on the drum, it is largely the second harmonic and the third harmonic with two nodal diameters that are excited. Tapping the drumhead towards the periphery excites the higher order overtones because the characteristic modes of their vibration require considerable amplitude of vibration towards the periphery of the drumhead. In fact, the loose annular flaps at the periphery serve to suppress the higher order modes of vibration because harmonics beyond the 5th or 6th do not contribute to the musical quality of the note. By placing or moving his fingers on the vibrating drumhead, the drummer can control the rate at which the harmonics or the note itself die down. Because of the several variable factors involved in the drumming technique, it is first necessary to obtain the relative intensities of the different harmonics under some (no doubt artificially) simple kind of excitation such as an impact over a small area of the drumhead. It is clear that even the basic strokes used in playing the drums are far more complicated than the simple impact type of excitation. Once the relative intensities of the harmonics for simple impact excitation are known as a function of the point of impact and the impacted area, it is possible to compute the relative intensities of the harmonics for the basic strokes.

Unfortunately a purely theoretical or a purely experimental determination of the relative intensities of the overtones even under impact excitation is beset with many difficulties. The theoretical difficulties are due to the fact that the radiation of sound by the drumhead in each mode of oscillation cannot be simply calculated without assuming artificial restrictions such as an infinite baffle surrounding the drumhead and so on, which do not correspond to the actual conditions of usage. Likewise a purely experimental determination of the radiation of sound by each mode calls for measurement of the sound pressure at a large number of points on a sphere centred at the drumhead. For these reasons, there is as yet no straight-forward way of obtaining the contributions of the different modes to the spectrum of the drum sound under normal conditions of playing the instrument.

However a beginning was made by adopting a semitheoretical procedure. The procedure consists of determining experimentally the so called radiation resistance of the drumhead when it is vibrating in each of its characteristic modes. The radiation of sound by a freely vibrating drumhead causes the amplitude to decrease at a rate depending upon how much sound power is radiated. The more the radiation, the faster the decrease in amplitude. The rate of decrease is also related to the sharpness of the resonance peak in the frequency response of the drumhead. The frequency response is a curve which shows how the amplitude of the drumhead varies as the frequency of the exciting sound is slowly varied. Thus the strategy for determining the

relative intensities of the different modes is to first obtain the frequency response of the drumhead for each mode and then determine from the curve a quantity called Q , which is a measure of the sharpness of resonance. A mathematical relation then gives the sound power produced by each mode when struck with a certain velocity at any point.

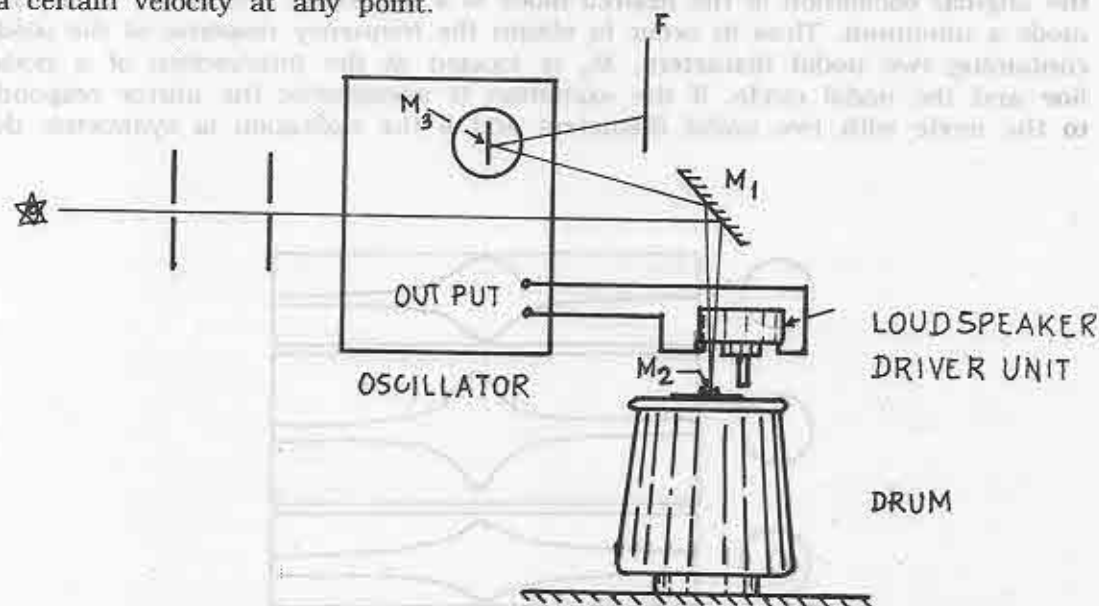


FIG. 9
EXPERIMENTAL SETUP TO OBTAIN FREQUENCY RESPONSE OF THE DRUMHEAD NEAR EACH OF ITS RESONANCE FREQUENCIES.

An experimental setup⁸ used for determining the frequency response of the drumhead near each mode is shown in Fig. 9. A narrow beam of light from a light source S falls on the mirror M_1 which reflects it on to a small concave mirror M_2 which is fixed on the drumhead. After successive reflections from M_2 , M_1 and M_3 the beam is brought to a focus on a photographic film F . The mirror M_3 is carried by the shaft containing the frequency tuning condenser of the oscillator. The output of the oscillator is fed to a loudspeaker which excites the drum by resonance. The position of the mirror M_2 on the drumhead is critical in isolating the desired mode of vibration. As a rule the mirror M_2 should be fixed on a nodal line of the desired mode. When the frequency of the oscillator is well below the resonance frequency the drumhead exhibits little vibration but as the resonance frequency is approached, the mirror executes angular oscillations proportional to the amplitude of vibration of the drumhead and the spot of light begins to spread out into a line. Therefore, by starting a few cycles below the resonance frequency and sweeping slowly through the resonance, the spot of light gradually widens into a line and collapses back into a spot. However, as the mirror M_3 also rotates in sweeping through the resonance, the position of the light spot/line on the photographic plate

varies with the frequency. Thus we can obtain a record of the frequency response curve of the drumhead near any desired mode of its vibration. With this setup the frequency response of two or more modes having the same frequency can be separated out by locating the mirror M_2 at a position where the angular oscillation of the desired mode is a maximum and of the interfering mode a minimum. Thus in order to obtain the frequency response of the mode containing two nodal diameters, M_2 is located at the intersection of a nodal line and the nodal circle. If the excitation is asymmetric the mirror responds to the mode with two nodal diameters and if the excitation is symmetric the

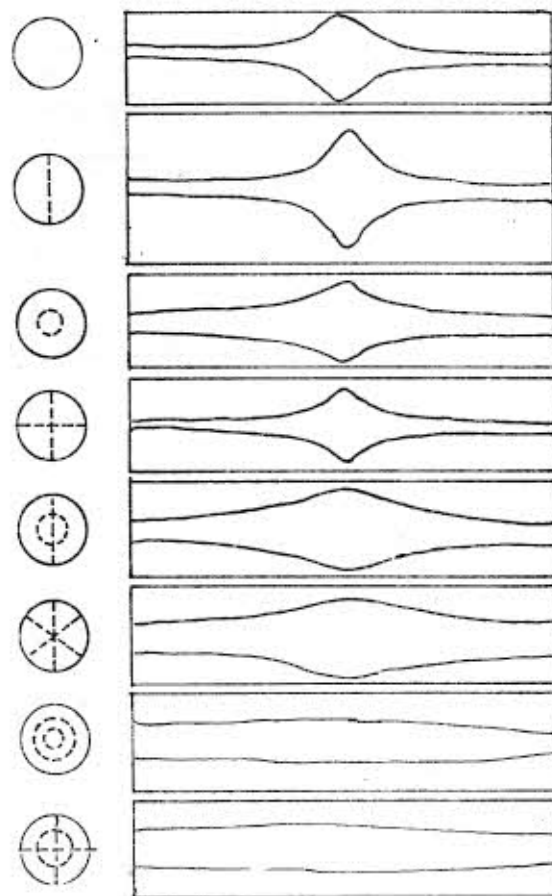


FIG. 10
FREQUENCY RESPONSE CURVES OF THE DRUMHEAD
NEAR EACH OF ITS FIRST EIGHT CHARACTERISTIC MODES

mirror responds to the mode with the nodal circle. The frequency response curves obtained for different modes in this manner are shown in Fig.10.

It is seen from these frequency response curves that the fundamental has a broader resonance than the second harmonic (i.e., the peak of the second harmonic is sharper). This means that the fundamental damps out faster than the second harmonic. The reason is that in the fundamental mode of vibration, the drumhead pushes air back and forth, whereas in the second harmonic mode of vibration the air moves along the surface of the drum from one side of the nodal line to the other side without radiating as much power into the open as in the fundamental. Similar qualitative explanations can be advanced to account for the frequency response obtained for the different modes.

Techniques of frequency and intensity measurements have advanced substantially since the measurements described above were done almost forty years ago. Instruments which can display in real time the frequency components and their intensities in a complex tone are now readily available commercially. In a recent study Rossing⁴ and Sykes measured the frequency spectrum of the basic strokes *nam*, *din*, *deem* and *chapu* for a mridangam and find that (1) *deem* stroke gives the strongest fundamental followed by *din* and *chapu*, and *nam* tends to suppress the fundamental, (2) the second harmonic is always about 20 dB below the third harmonic and that their ratio remains the same in all strokes, and (3) the *nam* stroke gives a strong fourth harmonic.

R.B. Bhat⁹ also measured the frequency components present when the strokes *tha*, *dhi*, *thom*, *num*, *chapu*, *arachapu* and *dhin* are played separately at one half second intervals. He found that while *chapu* and *dhin* sounds show 8 harmonics, the other strokes contain other frequency components also.

The scientific position now is that while we understand reasonably clearly the characteristic vibration patterns and their frequencies for the drumheads, we need better understanding of how the relative strengths of the different frequency components are controlled and also the spectral characteristics of the basic strokes used to build the different rhythms. As for the practical utility of such scientific studies, it is perhaps quite safe to mention that a real-time frequency analyzer and a trained technician can be of great help to the drum maker in making drums with more accurately controlled frequency components. Joint studies by musicologists and acoustical scientists should pave the way for advancement of the art of making drums.

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Tālavādyās

Sri K.S. Mahadevan

PROLOGUE

When I think of Laya Vidwans in general, three vivid images flash across my mind: First, the thani avarthanam at M.S. Subbulakshmi's concert at the U.N., when a lay audience comprising the world's statesmen gave the young Ghatam vidwan Vinayakram a round of applause even before veteran Mridangist Dr. T.K. Murthy got it.

Second, when for the first time in Bombay in 1949, Palghat Mani Iyer and Palani Subramanya Pillai (Kanjira) accompanying GNB, were associated in a thani of nearly 45 minutes of a fiercely fought percussion battle, at the end of which the public went into such a delirium as almost to dance within the Podar College Hall.

Third, way back in the late fifties at the Shanmukhananda Building Fund Festival, when Alathur Brothers were performing with Palghat Mani Iyer (Mridangam) and Umayalpuram Kodandarama Iyer (Ghatam); In the third round of the Thaniavarthanam, a fast, rippling, tuneful 'faran' by Kodandaramier got the applause first, to the surprise and even discomfiture of Mani Iyer!

More recently, in the course of a fusion concert at Madras consisting of sitar, guitar, tabla, ghatam, a teenage girl (a dancer) giving a Konnakol demonstration, which drew a tremendous applause from the audience.

Doubtless, many of you present here can recall similar thala duels that produced intense excitement among both the cognoscenti and the layman. What do all these experiences prove? The answers can be very interesting and educative.

In the particular cases cited above, the majority of the audience could not, and perhaps did not, follow the complexities of the rhythm, the tala. When giants are operating, even the technically trained artists, often fail to comprehend the movement or the ideas behind rhythmic segment or sequence of segments. But even in a sophisticated tala battle, there has to be some plain, orderly movements conforming directly to the elements of the tala, and perhaps combined with aesthetic touches like Chappu, Arai chappu, Gumki on the mridangam, the rippling sounds on the Kanjira and Ghatam, all based on what is known popularly as "Sarvalaghu". Rhythm's assertiveness through changes in the gait such as mishra, thrisra nadais, is never lost on the audience, not to speak of progressions in the same kalapramana as the music. It is also but seldom recognised that, just as the human voice has its own

timbre, richness, melody etc., the percussion ensemble provides its own sounds—Who has not been titillated or elevated by the last phase of a thani when all the percussion instruments jointly perform the traditional *mohara* with its unfailing crescends?

Thus, the essence of percussion is diversity in unity and unity in diversity, alternately manifesting each other; and the whole structure is dovetailed neatly into the musical fabric of the main performer. In fact, the word 'main' artist is a misnomer here. He or She is only the first among equals. If you want to appreciate better the point of this aphorism, just give an able singer an inferior mridangist and what a shambles the concert can become! And how utterly boring!

Credit for the discovery of the aesthetic and technical impact of talavadya science on the course of a concert, instrumental or vocal, belongs to the savants in Karnatak Classical music. Even in the Hindusthani tradition, hoary as it is, they never explored the mysteries of tala as our South Indian maestros like Tukaram, Narayanaswami Appa, Nannumiya, Manppondia Pillai, Dakshinamoorthy Pillai, Iluppur Pancapagesan, Konnakol Pakkiri Pillai, Tanjore Ramadas Rao, Tanjore Vaidyanatha Iyer, Ghatam Sundaram Iyer, Moharsing Seetharamier and the later generation of Vaidyanalingam Pillai, Palghat Mani Iyer, Palani Subramanya Pillai and the present generation of Palghat Raghu, T.K. Murthy, Umayalpuram Sivaraman, Trichy Sankaran, Karaikudi Mani these maestros are all constantly exploring further possibilities in tala disciplines and regaling performers and audiences with fresh landscapes in rhythm.

As T.S. Eliot put it: *"For order to persist after the supervention of novelty, the previous order must be, if ever so slightly, altered; and so the relations, the proportions, values of each work of art towards the whole are readjusted; and this is conformity between the old and the new"*. It is this "adjustment" that present day percussionists are trying to effect—if only because the formats of Nagasvaram, Thavul playing, and of vocal and instrumental concerts have also changed. As a wise man put it, "Change is the process by which the future invades the present". The invasion is on.

Most of you would have observed the keen interest evinced these days in the performance of tala-vadya, by the public. More than at any time in the past 25 years, both a Ghatam or Kanjira and lately even Moharsingh, are seen on music platforms. The recent splurge of interest, if not excitement, in vocal duos like Bombay Sisters, Hyderabad Brothers, the Hyderabad sisters has made another percussion instrument besides mridangam, almost mandatory. Interest in Pallavis that had waned for some years, is also reviving, which also means the interplay of mridangam with Kanjira or Ghatam or both. The pendulum is again swinging back to rising interest in the techniques of percussion, thanks to talavadya cutcheies Sruthi-laya has organised and the

Laya Vinyasam encouraged by All India Radio, and the magnificent contribution of this Art Centre.

These developments have already given the *coup de grace* to such grossly unfair and misleading characterisations of laya demonstrations as "gimmicks", "gymnastics", etc. and have reinstated laya to its royal level as a great Art in itself. At the international level, there are powerful forces at work. From San Francisco to Tokyo, the tabla, the mridangam, the Kanjira and ghatam figure in concerts, either alone or in combination with instruments. This is an opportune time to revive in our own country the percussion arts of Moharsingh and Konnakol, which except for two or three players have remained dormant for lack of artists to take them up.

KONAKKOL

Being very old has sometimes its advantages and Yours Sincerely at 79, can recall vividly the stunning exhibition of Laya Vadyas by such great giants as Azhagunambi pillai, Dakshinamurthy Pillai, Ghatam Sundaram Iyer and last but not the least, Mannargudi Pakkiri Pillai. One concert in 1929 or 1930 by the one and only Conjeevaram "Naina" Pillai, at Vannier Sangam School in Nadu Street, Mylapore, remains firmly fixed in my mind. It was what is euphemistically 'full Bench' in those days. Friends your imagination would boggle at the mention of the accompanists at this concert—Govindaswami Pillai (Violin), Dakshinamurthy Pillai (Kanjira), Alagunambi (mridangam), Sundaram Iyer (Ghatam), Sitarama Iyer (Moharsingh) and, as if presiding like a Nandi over this set-up, there was Mannargudi Pakkiri Pillai doing konakol, sitting right in front, facing Govindaswami Pillai. There were, in this concert two avarthanams one after 2 hours from the beginning and the other, for a gargantuan Pallavi. Each took about 45 minutes, which they could afford in those days because the cutcheri lasted from 4.25 P.M (punctually) till 9 P.M. Pakkiri Pillai was the "foreman of his fantastic laya group, an honour conceded to him most respectfully and cordially by all the artists present, more particularly by Naina himself as Pakkiri was his Laya Guru.

Another occasion when a similar laya constellation was seen was at Shencottah, during a marriage at S.G. Kittappa's house - Naina Pillai, Ramdas Rao, Dakshinamoorthy Pillai and Konnakol Pakkiri Pillai, Marungapuri (Violin) in the year 1932. This concert went on for 6 hours almost, with each Vidvan at his brilliant best and Pakkiri spearheading the laya thrust. It is on record that Naina Pillai, after the concert, stated that it attained such heights as to make each of them become arrogant and "that is not good for our future" he concluded.

Still another occasion was a concert of Naina pillai at Coimbatore, arranged for collecting funds for Tyagaraja festival, when Pakkiri Pillai provided Konnakol accompaniment. Sir R.K. Shanmukham Chetty presided, but made unflattering remarks about Konnakol which hurt his pride.

Just as we poor mortals can only visualise the celestial battles between Asuras and Devas, I can only convey a general impression of the *atmosphere* enveloping the tala-vadya exhibition that day. An impression that remains green in my mind is the terrific lakshya layaprastharas engaged in between the Kanjira and the Konnakol, which the others could barely match, with that Lion of Laya. Nayana Pillai himself keeping immaculate time measure through all those bewildering patterns of rhythm.

Another striking impression noticeable was the euphony of the Konnakol syllables uttered by Pakkiri Pillai in a torrential manner. I have listened to the greatest mridangam vidvans, not excluding Alagunambi, Dakshinamurthy, Ramdas Rao, etc. but Pakkiri Pillai's oral solfa syllables like 'Tadhimi taka Jhannu', 'Ta Dhi Jham', 'Taka Dhimi tari' 'Thana Takkita' 'Ta dhin ginna tom', 'Tadhin gina tom' etc. Even seasoned experts could not quite follow his intricate patterns, his tongue twisting and amazing *sollus*, all created on the spur of the moment. Such originality, such a computerised mind working on tala varieties, must be put down to the inspiration he got from his Ishtadaivata Lord Muruga, who was resident in his heart. No wonder even laya wizards have compared his mind to the similarly complex minds of great scientists, like C.V. Raman, Einstein etc.

A peep into Pakkiri Pillai's life is worth studying. Born in 1867 at Mnnargudi (8 years senior to Dakshina murthy), he first played the Taval but gave it up. He went to Malaikottai Govindaswami Pillai to learn mridangam. Still, unhappy at the world's treatment of his art, he joined Naina Pillai's ensemble as Konnakol vidwan. He taught music to Naina Pillai's wife. The significant aspect of Pakkiri's aesthetic soul was his intrinsic understanding of swara-laya and the basic ingredients of sahitya, melody, suswara etc. He would feel cut up if a vidvan mutilated a Kriti. Pieces like Tyagaraja's "Adhaya Sri (Ahiri) 'Mariyada Kathlah' would enthuse him to a great extent. His favourites were the Thiruppugazh hymns. His devotion to Lord Subramanya was total. He cared only for Him. He virtually turned his back on the world and lived the life of a mendicant. He was interested in Natya too and used to watch Balasaraswathi. He was what Naina Pillai called a 'Jnani', who believed in Karmayoga. For example, even though his daughter, daughter-in-law of the great Pandanallur Meenakshisundaram Pillai, died, within a week thereof, he accompanied Naina Pillai, along with Dakshinamurthy Pillai (Mridangam), at the marriage of the daughter of Tavul Meenakshisundaram Pillai. The galaxy of layavadya vidvans like Palani Muthiah Pillai, (father of Palani Subbudu), Manpoondia Pillai, Iluppur Ponnuswami (uncle of Tavul Panchami) Ghatam

Krishna Iyer, not to speak of Konerirajapuram Vaidhyathanatha Iyer and Dakshinamurthy Pillai, respected him for his artistic integrity, his laya genius and not least, for his Muruga bhakthi. Konnakol Pakkiri Pillai enriched art but was quite at home in poverty. From all known accounts, it was his genius that evolved the Konnakol art, now lying in decadence. His son Vaidyalingam Pillai gave a few concerts but soon gave up because he lacked charisma. Perhaps, the Pakkiri's are born once only in a millennium.

The art of Konnakol has to be viewed not only as rhythm in excelsis but as one conducive to educating the public which is now evincing greater interest in talavadya generally more than at any time before. When the ordinary rasika listens to mridangam, for instance, he is seldom aware of the constituent solfa syllables that make up a *Theermanam* or *Kuraippu* such as *tat, dhin, do, nam, jhanu, taka* etc.,. The Konnakol artist spells out these by syllables and shows how they all fit into a pattern.

Just as in dance, knowledge of karanas, adavus, abhinaya helps better understanding of a performer's achievement, so too Konnakol will help to appreciate the accuracy or originality of the percussion artist. Hence, in the developing scenario for the restoration of the arts, revival of Konnakol should find a place.

It should not demand too much from a percussion artist as, after all, every student of talavadya learns first the solfa syllables before translating it to his laya vadya. One has only to listen to a teacher of laya to understand this point. Listening to a veteran like Dr. T.K. Murthy utter the constituent syllables of a sequence of tala can be a uplifting experience. Every talavadya vidvan is *ab initio* a Konnakol artist in himself. What is needed, therefore, is to bring them out and demonstrate the verbal side of their great art.

By turning up, even occasionally as Konnakol artists, they may develop their creativity better than in their laya vadya because it affords scope for manodharma of a rare quality, as was the case with Pakkiri Pillai whose roller-coaster rides of laya amazed all his contemporaries and went far beyond the intuitive explorations on the Mridangam or Kanjira. I suggest therefore that this Centre draws up a plan for the popularisation and practice of Konnakol.

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TALA VADYAS OF KERALA

Sri L.S. Rajagopalan

Kerala has a large number of Tala Vadyas. The types are so varied. Most of them are connected with temple rituals and temple worship and with folk rituals. Kavus are the most ancient of temples of Kerala and they are dedicated to Bhadrakali or Sastha. The rituals are connected with the fight between Kali and the Asuras like Darika. That may be one of the reasons for such a large number of Drums some of which are classified as Asura Vadyas in contradistinction to others known as Deva Vadyas. The tantric nature of worship in Kerala seems to have contributed to the importance given for Tala vadyas. Gestures are given greater emphasis than the Mantras. The sound from the drums may be a substitute to the chanted Mantra.

The way musical instruments are classified in Natya Sastra is very apt:

*Tatam cha Avanaddham cha Ghanam Sushirameva cha
Ghaturvedham tu vigneeyam Aatodyam lakshnaanvitham*

The stringed ones, covered ones like the drums, solid ones like the gongs and the ones with holes like the pipes.

There are musical instruments belonging to all these types indigenous to Kerala and one surprising thing is that even instruments normally intended for playing melody are used for Tala. I am tempted to remark that in North India the emphasis is more on melody than on Tala, in South India in general the intricacies of Tala are given equal importance, but when you come to Kerala you find an overbearing importance being given to Tala and a neglect of melody. I shall give below the names of various instruments belonging to various types.

Tatam: Pulluvan Vina (also called Vina Kunju), Pulluvan Kutam Nandunni, Villu, Kutukka Vina

Avanaddham: Paani Maram, Chenda, Achen Chenda, Para, Edakka, Timila, Maddalam (Toppi and Suddha types) Kiti Piti (or Idu Piti), Damanam, Veeranam, Tappu, Chetty, Vadyam, Nagara, Tudi, Eazhara, Udukku, Mizhvu.

Ghanam: Chengila, Elathalam, Kuzhi Thalam, Kinnaram (Kai Mani) Chipla, Kokkara, Kolu, Chilambu, Aramani, Ponthi and Kinnam

Sishiram: Sankhu, Kompu, Kuzhal (Kurum Kuzhal) Eazhava Vadyam.

It is to be noted that different names are used for the same instrument in different areas. There would be some instruments which are confined to certain areas or certain temples that they are practically unknown outside. For example I found a drum which is only a very big Chenda in Kannapuram Temple in Cannanore Dist. It is called Pataha Vadyam there. There are some Ganjira type of instruments used by Muslims in a form called Arabana Muttu. The Tribal people living in Western Ghats have also many different types of Drums.

Important functions where these instruments are used is listed below.
Temple Rituals - Paani Kottu, Singing at the Sopana during poojas, Bali poojas (for propitiating the guardian dieties of the temple), Circum ambulation of the temple, Kalam Paattu and the Velichapad's oracular predictions.

Temple Processions during temple festivals - Chenda Melam, Pancha Vadyam, Keli, Pattu.

Performing arts like Kathakali, Koodiyattam Krishnattam, Ottan Thullal, Katha Prasangam, Bhajana.

Folk Rituals and performances Patayani, Mudi yettu, Kanyar kali Kolkali Poorakkli puli Kali Kummatti, Kalam Pattu (like those of Pulluvan, Mannan, etc) Ivar Kali, Theyyam Tira.

Before considering the use to which these instruments are put I would like to mention about the Talas used. The following are the main ones.

Name	Equivalent in Carnatic Music	No. of Matras
Chempata	Adi (Jhompata in Sanskrit)	8
Panchari	Roopakam	6
Adantha	Ada	14
Champa	Jampa	10
Tripata	Trijputa	7
Eka	Ekam	1
Dhruvam	Dhruvam	14
Muri Adantha	Chapu	Normally 7 (6 or 5 at times)
Anjadantha*	Not known	16

(*This is similar to Ada thala but has six matras for the Laghu i.e beat with 5 finger counts.)

The following talas are used in bali ritual in temple poojas

Moonaam talam	7 matras
Matakku talam	5
Thakatu talam	6
Anchaam talam	9
Eka talam	1
Sambhu talam	3
Mangala talam	4
Random talam	3
Nalam talam	8
Sakatu talam	3

Names of some other Talams used in certain rituals and in art forms like Ottan Tullal are Kundanachi, Kumbha, Marma, Lakshmi Karika. In Mannan pattu they use a Talam called Aana Tookkam. Tookam in old malayalam will mean a Tala, so its modern name should be Gaja Talam.

The following are some of the special features of Talas in Kerala.

1. It would appear that the concept of the old tala system of 108 talas with their Drutam Laghu Guru etc. is still lingering.
2. The concept of Jaati for laghu is absent.
3. Methods of beating out the Talas are different from what is done in Carnatic music. The mode may also vary when it is used in different art forms. The emphasis given may be done a different spot.
4. Gati is called Kooru, Tisra Gati is Panchari kooru, Misra Gati is Atantha Kooru and Khanda Gati is Champa Kooru. These are used when playing laya vinyasa on individual instrument. The Solo Tani avartanam on the chenda is called Thayampaka and this is the most popular and well developed performance. The solo on other instrument like Maddalam, Kombu etc are called Pattu.
5. Vilamba Madhyama and Druta kalaas are accepted, but in actual practice there is also the gradual increase in the speed. In temple rituals the correct doubling of the tempos is maintained.
6. Anudruta is termed as Viramam.
7. Some wind instruments like the Kurum Kuzhal and Kombu are used as Tala instruments. Some string instruments like Pulluvuan Kudam, Pulluvan Veena and Nandunni and the villu are also used as instruments for rendering Tala.

Drum ensembles are one of the special features in Kerala. A combinations of various instruments even upto a hundred or more played together, is a special feature in Kerala. Some important ones are mentioned briefly.

Chenda Melam: This is done during temple festivals and processions. It consists of a number of Chendas, Kombu, Kuzhal and Ila thalams. The lead chendas (called Uruttu chendas) are played with a stick in the right hand and the palm of the left hand. The playing is done on the tension end of the chenda. For every uruttu chenda there will be about four Veekkan chenda (chenda played on the booming side with a stick in the right hand. This is for doing the beats of Tala) three Ila Thalams, one Kombu and one Kuzhal. the Uruttu chendas will be in a line and behind them will be the veekan chendas and the Ila thalams. The Kuzhal players will be behind them. The lead uruttu chenda player is the one to control the performance duly assisted by the lead kuzhal player who stands opposite him. The drumming can be in various Talas and will be played in four or five kaalam (tempos). Each kalam is played according to the time allotted. Chempata, Panchari and Paandi are the normal melams that are played. There is a particular Jati for a Talavattam and it is repeated over and over. After rendering a few talavattam, there will be a Kalasam (Muthayippu). After that the same old Jati is repeated. But with a slightly increased tempo. After completing a few sequences like that the next stange - 2nd Kaalam - is started and the jatis and kalasams played. Then the 3rd, fourth and sometimes the fifth kalams are played. The flourish of the chenda, the Kombu, the Kuzhal and Ila thalam and the enthusiasm of the connoisseurs is a sight to see.

Panchari melam is normally done inside the temples and Pandi Melam is done outside the temple.

Pancha Vadyam: This is delightful combination of Timila, Maddalam, Kombu, Idakka and Ila thalam. Sanku is also used in the beginning and during the Kalasams. A full set will consist of seven Timilas, four maddalams, nine Ila thalams, seven Kombus, one Idakka and one Sanku. It is played during Deeparadhana time or for temple processions. Normal duration will be about 2 hours. The tala used is Tripura of Seven Matras. The first tempo has 56 matras in a talavattam the second one has 28 matras, next 14 matras and then 7 and even a final one of three and half matras.

Another small ensemble is the *Keli* which is normally played during the evening Deeparadhana. One Chenda, one maddalam and a pair of Ila thalams do laya-vinyasa in chempata Talam. Duration can be fifteen minutes to one hour. While set mnemonics are taught for this, there is scope for improvisation. This sort of Keli is also played at the venue of a Kathakali or of Krishnattam at sunset time.

The most important solo performance is the *Thayambaka* on the Chenda. The main chenda is assisted by four time keeping chendas - two playing the tension end and two the right ends. Two or three Ila thalams also would be there. The tala is chempata (Adi). The duration may be about one

and half hours. It is done in five stages. Pati Kalam, Kooru, Idavattam, Itanila, and Irikita. For the Pati Kalam - which means slow tempo the mnemonics for the beats are:

Nnam Nnam Nnam Dhim Nnam Dhim Nnam Dhim

The Pati Kalam is done in Chaturasra Nadai in three or four increasing tempos, though it is not in the vilamba madhyama Dhruta kalas. It is slowly increased. This will last for about half and hour. Then Kooru is played - i.e. a different Nadai is played - Panchari (Tisram), Adantha (Misram) and Champa (Khandam). Kooru playing is done for about twenty minutes, here also the temp is increased slowly. Then Idavattam having the beats Dhim Nam Dhim Nam Dhim Nam etc., for five minutes and Ida Nila having the beats Dhim Dhim Dhimmm is played for ten minutes. Then the Finale Irikita is done in the fastest tempo possible. Similar solo performances are done on the Maddalam Kombu Villu etc. There are called Parrus.

Mela Padam which is a sort of Tani Avartanam of the chenda and a Maddalam is done before the start of a Kathakali. It is done in Jhampa Tala. The chenda and maddalam players vie with each other for excellence and it is very delectable.

Combinations of Tala Vadyas are used in many art forms. Koodiyattam has Two mizhavs, an Idakka and 2 kuzhi talams. Kathakali has a Chenda, a Maddalam and sometimes an Idakka, a Chengila and an Ilathalam.

Krishnattam has a toppi maddalam, a Suddha maddalam, Chengila and Ilathalam.

For Pulluvan Pattu they use the Pulluvan Veena, Kudam and Elatalam.

MATERIALS USED

Metal: Bell metal of different grades - i.e., with varying contents of tin is used. In the case of Ilathalam the discs have to be cast and then forged. Proper heat treatment and the beating (forging) gives the proper tone. So also for the Kinnam used for Brahmini Pattu.

Wood: Jack wood is widely used, preference being given to the Varikka Variety of Jack wood. Konna (Cassia Fistula), Venga (Pterocarpus Mar-supium), Rakta Chandanam (Red Sanders), Arali (Frangapini), Karingali (Acacia Catachu), Kumizh, Coconut Palm.

Leather: Goat skin, Cow or bull/calf hide, Monitar Lizard, membrane from the stomach lining of cows, Buffalo skin, Monkey skin.

Strings: Made of cotton, Vakka fibre, palm fibre, leather thongs are used. Of late they have started using plastic ropes. Some have started using threaded steel rods and nut and bolt to tighten.

The construction of many of the drums is such that they cannot be tuned and they have only a fixed tension which may get loose slowly. Even in the case of drums which can be tuned, enough attention is not paid to fine tuning as in the case of the Mridangam.

I would now like to draw your attention to some of the special features of a few important instruments.

Paani Maram: A cylindrical drum a bit smaller than the Mridangam covered on both sides with cow hide with a black centre spot on the right end. It is played with the palms only and no fingering is done. Its only function is in temple rituals known as Paani. There are prescribed methods known as Saivam Paani and Vaishnavam Paani to be used according to the deity installed. The talas are complicated as the time interval between two strokes may be 64 or 32 matras. The player has to keep count in his mind and play the stroke at the correct interval. Any mistake is believed to incur the wrath of the deity. The player has to observe ritual purity and wear ritual dress. Few people come forward to learn this. For normal daily poojas etc the right end of the chenda is used in place of Paani Maram. A type of Paani has to be played if the deity is to be brought out from the sanctum - an equivalent of Mallari.

Mizhav: This is a big pot formerly made of clay, now out of copper. The mouth is covered with raw hide, fixed with rice paste and tied with rope and allowed to dry. This is exclusively used for Chkyar Koothu, Koodiyattam and Nangyar Koothu. Only members of the Mizhav Nambiar community can play this instrument in temples. It is considered to be a sort of idol of Nandikeswara. When a new Mizhav is made it has to be installed with religious rites like Jaata Karma, Nama Karanam, Annaprasana etc. upto upanayana, Nandikeswara being invoked into it. It is not to be moved out of the temple and it should not be touched even by authorised people unless they are ritually pure. When an old Mizhav is to be discarded the rites as applied to old idol, have to be adopted. Without the support of the Mizhav the chakyars and Nangyars cannot act properly.

Villu also called Ona Villu: This is a bow shaped instrument made from a three feet length of slat of bamboo or palm wood, a pencil thin rod of Bamboo fitted as string of the bow. It is held in the hand with one end resting on the shoulder and the tension on the bamboo STRING can be varied by pressing the slat. This produces various tones, when the string is struck with a small rod. It has been raised to a virtuoso instrument, though it has

not got the popularity it deserves. Many of the front ranking chenda players can play on this instrument beautifully.

Kombu: A three piece well metal tube fitted into the shape of a semi circle. It is played by blowing at the tapered end like one would on a bugle. Sa Pa Sa can easily be rendered. It is used as a Tala Vadya in ensembles like the chenda melam and Pancha Vadyam. Laya Vinyasa on it is called Kombu Paruru. It was used when the armies of old Kerala kings marched and it deserves to be used in our Army in place of the bugle. It is one of the few Sushira Vadyas used as a Tala Vadya.

Kurum Kuzhal: This is a small Nagaswara, similar to the Mohuri. It is described as Madhukari in the Sangeeta Ratnakara. One important difference from the Nagaswaram is that it has a hole to be covered by the right thumb when holding the pipe and it is the note Nishada that is to be rendered in it. Though it is primarily used to play melody it is also used to play rhythms in chenda melam ensembles.

Pulluvan Kudam: This is a pot with a hole at the bottom which is covered with hide. A leather thong is taken out through this hide through the inside of the pot and held taut by a slat. A plectrum is used to pluck this leather rope and it produces a weird Brum Brum sound, the tone of which can be varied by altering the tension. Rhythmic patterns are played.

Pulluvan Veena: It is a fiddle like instrument with a bowl resonator on top, made of wood, which is covered with monitor lizard skin. Only one string made of vegetable fibre is fixed and it is bowed with a bow also made of fibre instead of horse hair. The playing is done as on a violin for playing small melodies. The Bronze jingles are attached to the end of the bow and a shake given to the bow produces rhythmic jingles. Many of the top violinists in south India were fascinated by this rhythmic accompaniment attached to the bow. It is an example of a stringed instrument used for Rhythm. Both the Pulluvan Kudam and Pulluvan Veena are required for the Sarpa Kalam Pattu (like Naga-mandala).

Nandunni: This is also a stringed instrument, box like in shape with a tail like projection at the top. Two fibre strings are fixed and played with a buffalo horn plectrum. It has five frets which can alter the tone, but they are rarely used and it is used only as a drone and a Rhythm instrument. One important feature of this is, that this instrument has a position in between the yazh of ancient days and Veena, which got developed in the process of evolution.

Idakka: It has an hour glass shaped barrel and is considered to be a sacred instrument which should not be kept on the ground. Its construction

is similar to the Udukku and Tudi. Thin animal membranes cover the faces and the tension is varied by pressing on the connecting strings of the two faces. Palmyrah fibres fixed on the mouth of the end holes of the barrel produces a vibratory effect. One can play two octaves on it and so there are experts who can play kirtanams on it. In short it is a SINGING DRUM. It is a rare case of a percussion instrument used for melodic music. The instrument is a must for all temples and many art forms.

Chenda: It is cylindrical drum, most common of all Kerala instruments for outdoor performances. Even now it is not used inside the temple - that is in the inner circle. It is considered as an Asura Vadyam. The left end has a single cow hide and in the right end several circles of leather of diminishing diameter is fixed on the hide on the inside. It can produce about 7 tones. Formerly it was not used in Kathakali but now it is the most important one, thanks to the effort of great masters who have adopted it well for use in Kathakali. The Tani Avartanam or laya Vinyasa on it is called Thayambaka. It used to be liked by Palghat Mani Iyer and it has influenced his style of playing mridangam. Chenda Melam is an ensemble of a number of chenda; and other instruments and in some important temple festival even a hundred chendas will be played in unison and this is unique feature of Kerala.

In teaching the playing of the instruments the following points are observed.

1. Vaya-thari (Chol, or Bol or menmonices) are recited before playing. The mnemonics will vary from instrument to instrument.
2. Practice is done on a dummy instrument. In the case of chenda it is on a piece of flat rock. In the case of maddalam it is on two small circular wooden planks (in place of the face of the drum) fixed on a wooden rod having the same length as the maddalam. In the case of the Idakka it is on a small rectangular cushion like piece held on the left palm. In the case of the Mizhavu is on a leather covered hollow wooden cylinder and so on.
3. Small rhythmic phrases like Ta Ti Tom Nam etc are first learnt and practiced for long, especially early morning. There used to be a system called Nilavu Irikkal i.e. Practicing during the duration of the moonlight. None on new moon day, the practice is done daily increasing the period according to the phase of the moon. The practice will be for a full night on a full moon day and then reduced daily according to the phase of the moon till the next New moon. While this is a thing of the past there may still be people living who have done this in their younger days.
4. The method of beating out the Rhythm may vary in different forms. In Kathakali for example Chempata Tala (Adi Tala) is done:

Dhi Yi Dhi Yi Tai Yam ta ta
x o x o x 1 2 3

For Champa (Jhampa) it is

To yi ta tin nta ta kita dhi dhi kita

For Atanta (Ada)

Te Yi ta ta tha dhi Yi ta ta tha Dhi Yi Dhi Yi

For Panchari (Roopakam)

Dhom x Ta Thin Ta Ka

Drumming in temples was the traditional right of Marar and Poduval communities, and even now it is followed in the old temples. Their families used to be assigned paddy lands and a share in the cooked rice offerings of the temples. The land reforms has changed all that. The heads of families used to take steps to see that the boys in the family were trained properly, but, in the changed circumstances this is rarely the practice. Fortunately a few institutions have been started to teach some of the instruments. The student are given some stipend and this is of some help.

Many may not be aware that drum ensembles are used in church and mosque festivals. Artists belonging to the "backward" communities used to take part in such festivals, but now "forward" communities have also started taking part in such festivals due to the changed social and economic conditions.

Two decads ago there were no books explaining the theory and practice of these instruments. A few books have started appearing now. More would have come out but for the high cost of publication and the lack of financial help from institutions. Much remains to be done to preserve the traditional art of Drumming and to make improvements and innovations.

-oOo-

TALAVADYAS OF ANDHRA

Dr. B. Rajanikanta Rao

While commending the idealism behind the inception of such an institution like this, Percussive Art Centre to promote awareness among the lovers of Karnatak music, and arranging such seminars like this, I hope, I will not be mistaken if I say that Akashvani-or-All India Radio, should be given the credit for popularising ensembles of Talavadya, through their programmes of layachitram and Talavadya Katcheris. Master players on various instruments of classical music, were participating in those programmes, coming from all corners of the region governed by Karnataka music, the then Madras Presidency including Mysore and Trivandrum.

After my retirement as Director of AIR at Bangalore in 1978, I had a stint at Tirupati as the special officer or Director of Sri Venkateswara-Kalapitham, in the inaugural function of which in 1979, I had arranged a Talavadya Kacheri headed and programmed by Sri Kolanka Venkataraju, the senior most Talavadya Vidwan of India, still living with us in his eighties in Payakarao Peta, Tuni. The late Dolu vidwan Muni Ramayya's inclusion in that ensemble makes me feel so happy, that among the vidwans of Dolu, or Taval, you will rarely find such a perfect artiste.

Among others who participated in that inaugural Talvadya ensemble of Kalapitham, I remember the names of the late Sri Annavarapu Gopalam for ghatam, and Sri Guntapalli Krishnamurty on Khanjira (still associated with T.T.D., Tirupati) and morching by the late Sri Annavarapu Basavayya.

These Percussive ensembles with a classical orientation, suffer according to my estimate, from inadequate representation and accoustical obsessions due to certain instruments being too loud and certain others too feeble in the production of adequate volume.

During my boyhood, in my native place Pithapuram, which was a zamindari township under the aegis of a Maharaja, a patron of scholars, poets and musicians like my father and, the late Vinaacharya Tumarada Sangameswara Sastri - we used to witness an ensemble of entirely percussive instruments, which used to follow the bullock-cart carrying the nagara or Naqqara - a 'lanchana' presented to the Maharaja by the Golkonda Badsha.

The all-percussion band consisted of a variety of drums, Dollu, Ramdhollu etc., and mridangas of various sizes - which used to adorn the wedding pandals and processions also in those days, but gradually had been displaced by wood Brass Band playing cinema tunes during recent years.

To give you an exact picture of the regional characteristic of Talavadyas of Andhra, the title of my today's paper, I shall quote a few stanzas from the Dwipada Couplets of the 15th century poet of Andhra, Srinadha. From *Palnati Veeracharitam* ballad by Srinadha, the following consisted of the army orchestra:

"Mundu **damāyeelu**, **muraṇa** sanghamulu,
Booralu Bhereelu, pōtudaralunu,
Kāhali, Vankini, kāli kōmmulunu
Sankha Aamūhambu, sannāyi jōllu,
Nagaralu, **Tappetal**, Nayamaina **dollu**,
Tammattammulu, enchadagu **Veeraṇamulu**"

From *Kālamarāju Kathā*:

"Ghanamaina **ninjalu**, **Kanaka Tappetalu**
Chēgantalu, mari Chirugunta chayamu
Tappetalu, **tudumu**, Tarachu **Vādyamulu**,
Booragal, kōmmulu, Bhuvi daddarilla,
Bheri dhamāmīlu, **pedda gaurulunu**,
Ghana mridangambulu, **gadda cherulunu**."

Besides Dolu or Tavils, and mridangams in these quotations, we find a galaxy of folk instruments of percussion, which carry the smell of the soil, or the regional characteristics, and I am also sure most of these names of instruments are commonly found in Karnataka also.

Although my quotations are from a literary work of the 15th century, I am glad to intimate to you that most of these instruments are alive even today, and the players or artistes are spread out in all the corners of the state say from Anantapur, to northern districts of Telangana and Visakhapatnam and Vijayanagaram agencies.

A couple of years ago, Akashvani Centre of Vijayawada got an international award from the Hoshbanka Foundation, Kaulalumpur, for its programme on "Laya" which covered performances on the various folk instruments of percussion, mentioned above, some not mentioned. The programme Producer Sri K.V. Hanumanta Rao, Music Producer, AIR, Vijayawada shall be playing back a cassette containing the sound effects from the recorded programme on "Laya" - the total duration of the cut-outs of playing of different instruments does not go beyond to 10 to 12 mts.

The first cut in the tape contains the playing on the "Dolu Koyyalu" - performed by Koyas of Vijayanagaram agency area.

-Cut 1

The second cut is "Dhimsa" - tribal dance of Vijag agency area. This consists of the instruments - Kiridi, Tudumu and Deppu all percussion and—Mori—a type of sannayi.

-Cut 2

Now we have "Jamuku", which is also called jamidika. Here is a Sisa padyam of Srinadha describing the folk musical playing the jamidika.

*Kaksha nikshipti vikaswara swara vilāsa Srīnivāsamba janudikandu
Kattina tantriki kantha srutikī gooda chokkambugā nāri sobagu mīra
Alāpamula suddha śālagā samkīrṇa vividha rāgambula chavulu choopi
Dama dama dhuwānula botārinchi yedaneda kattera mārgambu bittarilla*

*Vādiya vaikhari kadu nera vādiyanaga,
Eka Vira Mahā devi yeduta nilchi
Parasarāmani katha lella pradudhi bāde
Chārutarā kirti bavanila Chakravarti*

-Cut 3

The same instrument is called pamba or oggu in different districts.

"Garagalu" are the pots decorated with saris representing gramadevata—held on the heads by villagers—called Asādulu dance, and through their dance they worship devata. These garagalu are the same as Karakam of Tamilnadu, which name and feature is common in Karnataka also (Karagam). The instrument played in this connection is called Kanaka tappeta, a smaller size of 'Dappu'.

-Cut 4

Guravayyalu—a group of Saivaite devotees of Anantapuram—they are prevalent in Karnataka also. They play the damarukam (Budabudake) the vadyam used by Lord Siva when the alphabet and the seven notes came out according to Nandikeswara's "Rudra Damarudbhava Sutra". Guravayyas playing the Damaru.

-Cut 5

Here is an instrument called urume or urumulu, on the left side of which a curved stick is dragged on the Karini, producing a wierd sound. This is called viranam also. Srinatha described this uruma, as carried by a jakkala woman on her things, she sings the love songs of Kameswari for Lord Vishnu.

-Cut 6

*Koṭāgra samgharsha ghuma ghuma dhuwani tāra
Kantha swarambuto gāravimpa
Masi bottu bōṇāna-Asalu kolpina kannu
Kodupuche Thalinchu edapatadapa
Srutiki utkarshambu joopanga valayache
Chevitredu bigiyinchu jeevagarra
Goṭku gilkuṇa mīṛāya kimkinī quchehambu
Tāṇamānambuti mēlavimpa*

*Rāgamu nānundi langhinchu Rāgamunaku
 Uruma yurudiwayambu pai ottigilla
 Kamavalli Maha Lakshmi Kaitabhāri
 Valapu pādunchu vachehe jakkula Purandhri*

Now we have the veeranatyam of Veerasaivas accompanied by what are called, Tasha marapa or Kettle drums, and veeranam or urumu and dolu.

-Cut 7

Here is what is called Burrakatha which is accompanied by two gummetas or Burras.

-Cut 8

The last but not the least is Dappu, which is used for public announcements in villages. Even some orthodox families of higher castes have the convention of the playing of Dappu for auspicious or obsequious functions. I wonder at the ingenuity of some western minded musicologists to trace the origin of Dappu to the 'Tep' of the Arabs. Tep is used for romantic and sophisticated urban dances of damsels while the dappu is performed by the lowest and the most backward communities in our country.

-Cut 9

Muktayi Mohara by the classical percussion group.

-Cut 10

Conclusions

May you not brush it aside as an impractical utopian dream if I conclude my paper with a fond hope of mine, to envisage a gradual extension of platform of Talavadya presentation, to a few more folk instruments of percussion like Damaru, Dappu, Tasha, and Urumu, not excluding the Dolu or Taval - with an eye and ear for 'Sukhādhāra' or aesthetic appeal and variety without detriment to 'Lekkachara' and classical base.

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STUDIES ON LEATHER AND WOODS USED IN DRUMS

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There are innumerable number of drums used in this country. These instruments have a distinct name, shape, construction, technique of playing and quality of tones. Common feature of these drums is that, hides and skins are used in the construction of all drums.

The type of instrument used for a specific purpose has a direct relationship with the tonal quality of the sound produced.

In order to cope with the end use, the construction and the material used in these instruments has to be unique. "Panchamarabu" a Tamil book, which speaks about the grammar of music and dance, gives details about instruments and which leather should be used for which instruments and also the woods to be used for making the resonators.

The construction of drum heads and the skins used for it in some of the south Indian percussion instruments are give below.

Mizhavu is a single faced egg shaped big instrument which is used in Kerala. It produces very loud sound. Cow hide is used for this instrument. Goat skin is also used for it. The mouth of the instrument is very small when compared to the resonator column.

An instrument which has a comparable sound and shape is **Kudamuzhavu**, which is a five faced instrument. The leather used for this instrument is from deer skin. It is interesting to note that skin from different locations of the deer is used for different faces. The sound produced from the faces is also different.

Mridangam is a famous instrument of India. The right-head is made up of three leathers. The outer ones are made up of cow hide and the inner one is of goat skin. But in earlier days, cow hide was used in the place of goat skin. The left head consists of two leather layers from cow hide. It is customary that the hide of an adult cow (about 2 years) must be used. This may be due to the fact that the hides from the younger ones contain much of fat.

Suddamaddalam, is an instrument which is similar to mridagan in construction. But the sound obtained from this instrument is different. This instrument is used in Kerala. The right head is made up of 4 layers of cow hide, while the left head is made up of 2 layers of buffalo hide.

Tavil is another bifacial instrument of Tamilnadu. Left head of this instrument which is played with stick is made up of goat skin. The right face is also made up of goat skin. But the age of the animal from which the skin is taken for the faces is different. Ageing changes the skin structure of the animal and the music obtained will be different. This may be the possible reason for the selection.

Chenda is an instrument from Kerala that has two faces. The construction of the drum-heads is unique. The right head is made up of single leather layer. Where as the left side is made up of single layer, over which 5 or 6 concentric circles of leather having a decending diameter is pasted one over the other by using a special type of paste. The sound produced in this instrument is of very high pitch.

Kanjira is an example of a single face open type drum. It is a tiny instrument, but the sound produced is comparable to that of mridangan and this instrument is played along with mridangan in concerts. The skin used in this instrument is from varanus, a reptile. Ancient tamil literatures state that deer skin was used for this instrument.

Tappatai or dape is big instrument similar to kanjira. The leather used in this instrument is from calf skin.

In **Uddukku & Iddakai**, limid stomach lining is used. But the sound produced by these instruments with this thin lining, is of very high pitch and unique. The construction is in such a way that we can play songs in iddaka by varying tension.

In the same group **Timila** is another instrument used in Kerala. The leather used in both faces are cowcalf skins.

Tudi is another popular instrument which is used in Malabar and south Karanataka. Goat skins are used for the drum heads.

The loudness of these instruments described above when compared are as follows (in Table I)

$$\text{Loudness (dB)} = 20 \log_{10} \frac{V_2}{V_1}$$

Where $V_1 = 100$

Table 1

	Loudness (dB)
1. Mizhavu	+ 1.124
2. Kudamuzhavu	- 0.552
3. Mridangam	- 2.634
4. Suddhamaddalam	+ 1.127
5. Chenda	+ 0.133
6. Taval	- 1.452
7. Kanjira	- 2.633
8. Tappatai	+ 0.392
9. Idakka	- 1.295
10. Udduku	+ 0.695
11. Tudi	- 0.271
12. Timila	- 1.295

The sound produced in drums depends on many parameters. Construction of the drum-head, leathers used for the drum head, volume of the resonator, size of the instrument, the material with which the resonator was made were some among them.

In order to know the physical and structural relations of the skin with the sound produced, the cross sectional features of leather used in different instruments were studied. Apart from this some sundried skins of common animals were also studied.

Structures of sundried skins of animals are given below. In varanus skins (Kanjira) horizontal fibres running predominatly along the scale direction and the net work structure flows perpendicular to the scales direction.

In goat skin, there is no horizontal running of fibre bundles and the fibres is in loose weaving.

In sheep skin, the grain layer is comparatively larger than that of goat skin and fine fibres predominatly running along the hair follicles direction.

The major constituent of leather is collagen, a protein fibre. The three dimensional network of these fibres is different in different animals. The network structure is stable upto a certain temperature and above that temperature the fibres gelatinise and the three dimensional network changes altogether.

During sundrying, due to the removal of water, the structure changes and the final leather produced, has different structures in different animal skins. The packing of fibre structure varies in the same leather, at different

locations. The portion taken from the butt region is compact and has more strength and the portion taken from belly region has loose structure and has more stretchability.

In general, when a force is applied on to leather, the fibres are vibrated. If we have parallel oriented structure energy is transferred to the next without much dissipation. On the other hand when we have fibres oriented in different directions, energy is dissipated and the quality of sound is also very much affected. This may explain, that why varanus skin (kanjira) produces a sound which is comparable to the sound produced from a five layered skin head (mridangam).

In hourglass shaped drums, the wet skin is put on the instrument and then dried. The skin is thus, dried under tension. This will change the orientation of the fibres and in stomach lining, parallel orientation is obtained. This effect gives an explanation for the rich sound produced in iddaka, where stomach lining is used.

Although the physical structure of the membranes helps in the production of sound, the sound produced by an instrument depends on the size and shape of the resonator, the shell material, volume of the resonating column etc. as mentioned earlier.

In general, wood and in some cases metal is used as resonator. In common usage jack wood or neem wood is used for making the shells in South India. In special cases, specific type of wood is used for making a specific instrument. Tamil literature mentions, that only six specific trees should be used for making the resonator. But, nowadays, getting a good jack wood for making drums is difficult. Therefore in order to know the scientific background of the usage and also to find a substitute for the jack wood, studies were undertaken on woods.

Jack wood, neem wood, which were commonly used for making the drums even today were taken for study. Apart from these woods, those which are not commonly used for making the shell like mango, and teak were also taken for study. Anatomical studies were undertaken in vertical, radial and tangential directions. The moisture sorption characteristics and density of the woods were also studied (Table 2).

Table 2

	Teak	Jack	Neem	Mango
1. Relative density	0.71-0.82	0.53-0.63	0.72	0.61-0.79
2. Weight (lb/ft ³)	38-43	36	44	38.5
3. Growth ring	Ring	Diffuse	Diffuse	Diffuse
	porus	porus	porus	porus
4. Pore density (/mm ²)	6-13	1-4	4-12	1-6
5. Pore size	165-342	24-179	138-220	138-178
6. Fibre length (μ)	632-1677	743-1499	644-1414	742-1694
7. Moisture (%) 65 r.h.	8.7	13.0	13.8	13.8
95 r.h.	20.0	23.8	24.6	25.5

The table and the micrographs show that the jack wood has more fibrous structure than the others. The packing of the fibres is also very high. The pores present in jack wood is less when compared to the other three. The pore size and distribution of the material can be inversely propotional to the modulus of the wood. The density of jack wood is also less when compared to other woods.

$$V = \sqrt{\frac{E}{\rho}}$$

Where V = velocity of sound

E = modulus

ρ (rho) = density

Therefore the velocity of sound will be more when the pore size and distribution and the density is less.

The moisture sorption characteristics were also good for jack wood when compared to other woods. Moisture present in the system reduces the velocity of sound.

Due to the chemical substances present in jack and neem woods, these woods were not easily affected by white ants and fungus, when compared to mango.

These studies on woods reveal that in all respects, jack wood is superior to other woods for making the resonator and it will not produce any adverse effect on the sound produced in a musical instrument.

Problems in Manufacture of Drums

During the manufacture of musical instruments, there are lot of problems faced by the instrument makers. For example the non-availability of specific type of leather for making the instrument. If we take kanjira, literature shows that deer skin was used in Kanjira. Currently varanus skin is used for it. But now, killing reptiles and wild animals for their skins is prohibited and therefore getting these type of skins is difficult.

In that case what can we do for making kanjira? We definitely need a substitute for Varanus skin. We need a substitute, which has similar physical structure and must produce the same sound. Atleast in other instruments we can change the resonator size and mouth size and suitably use any leather. But in Kanjira, since it is a open type of drum, varying the size of the resonator does not help much. Therefore we must use a leather which has similar structure and properties to that of varanus skin. Studies on kanjira with different skins show that bandicoot skins can be used in kanjiras instead of varanus. The skin structure of lower mammals, like bandicoot has a structure similar to varanus, and has parallel orientation. Sound characteristics were similar with both skins. The feel of instrument made with bandicoot was tested by 3 players. They reported its suitability and can form a substitute for varanus skin.

Even in mridangam, previously the right-head was made from 3 layers of cow hide. But now the middle layer has been substituted with goat skin.

Therefore even if there is problem in getting the skins, a proper substitute can be found out depending on the structure of the skin. In a similar way, availability of jack wood problem, can also be solved by substituting with other woods which has similar properties like jack. For the preparation of mridangam shell, Dr. T.V. Gopalkrishnan tried with pithocolobium tree (Kodukapali in Tamil), instead of jack. Sounds produced from these mridangam are comparable to that of jack wood mridangam.

In conclusion, if we study the physical structural correlations and size of the instrument with sound, the available materials can be made use of to solve the material availability problem.

CONCEPT OF RHYTHM IN WESTERN MUSIC

Sri G. Raj Narayan



This paper gives a brief account of the basics of rhythm as used in the classical Western compositions. This is intended to be an introduction to Western terminologies and notations for an uninitiated person.

There are two features that strike you as soon as you hear a Western Classical music piece. The first, of course is the rich harmony, which gives the music its characteristic depth and grandeur. The other, to an Indian, would be the lack of an obvious rhythm depicted clearly by percussion instruments as in an Indian music concert.

However, if you listen closely, you will find a definite rhythm in every piece, even though it is neither shown up by percussion nor is it obvious. E.g., Mozart's Symphony # 40 in G Minor.

In fact, rhythm and its components are very well defined in Western Classical music. The tempo of every composition is clearly indicated by composer as Allegro (lively or cheerful, brisk), Allegretto (fairly lively), Presto (very fast), Andante (slow), etc. The time duration of each note is indicated on the staff notation by the following elements:

1 beat = crotchet	:	
2 Crotchets = 1 minim	:	
2 minims = 1 semibreve	:	
2 semi - breves = 1 breve	:	
1/2 Crotchet = 1 quaver	:	
1/2 Quaver = 1 semi-quaver	:	

For aduration of an odd number, say 3 beats, it is represented thus . This means, that the minim is sounded and the duration is 3 beats (since a minim is 2 beats). If the third beat is to be sounded, then it is represented as: 
(equivalent to our SA, or SA sa)

Every composition is divided into movements—Very often, a symphony would begin with a moderately fast movement (allegro) go on to a slower movement (andante) and then again this is followed by either a fast movement or moderately fast (allegro moderate)—so, a composition is not necessarily in the same laya throughout in contrast to our own Carnatic music where the

laya does not change, except rarely where the charana is taken at a faster pace.

E.g., Beethoven's concerto # 5 (Emperor) I movement, II movement and III movement. (I must add that in classical music there is no improvisation.)

Now, within the movement itself, there are several "bars" of music - you could perhaps loosely identify it with an avartha, if necessary.

These bars could have 2, 4 or 8, or 16 beats to a bar (this is the most common rhythm) as seen in the demonstration pieces. Rhythm of a composition is indicated on the staff notation as 2/4, 3/4, 4/4, 6/8, 8/8, 12/8, etc. This indicates the no. of beats to be played in a bar of 4 beats duration. 4/4 which is a straight forward rhythmic pattern is the most commonly used rhythm, perhaps because of its appeal to the lay listener.

3 beats to bar or 6 beats to a bar is also common, as we can see in the familiar waltzes and minuets.

E.g., Bach's Prelude in Fugue E Flat major in 6/8 rhythm.

Waltz from the ballet 'Nutcracker' of Tchaikovsky.

Allegro from Sonatina by Torroba played on the guitar by Andre Segovia.

Here, the difference is that the minuet has the emphasis on the 1st beat while the waltz has it on the 2nd and 3rd beats.

There are some rare pieces of classical music with 5 beats to a bar - this is seen in Mussorgsky's "Pictures at an exhibition" where one movement has 5 beats to a bar, and this changes to 6 beats to a bar (indicating change of mood while viewing different paintings at an exhibition). This is indeed very rare and perhaps could be very loosely identified with our own change in nadai to express change in mood.

Except martial music, use of percussion instruments is not seen in Western Classical music. Marches of course have drums, and the cymbals are used in some pieces to emphasis the climax of a movement.

Tchaikovsky's "Capriccio Italien" has used percussion instruments for effect and another composition of his, the "1812 overture" has a very unusual use of church bells and cannon, tho' not at all in rhythm and only as scattered effect, to indicate the victory of the Tsar of Russia over Napoleon in 1812.

With the advent of jazz, rhythm in a more definite and complex form was introduced to western music. With exposure to Indian and African rhythms and rhythmic patterns of 7, 9, 10 1/2, 11 and 13 beats etc they have quite a few solo drum sessions with a lot of improvisation and this perhaps has appealed to Indian musicians, leading to fusion music, etc.

Syncopation is another aspect of western music that is being explored more and more in recent times. This has also been due to the influence of jazz. This is similar to the 1/4 or 1/2 akshara 'eduppu' used in Carnatic music.

Tradition and conservatism are terms that are relative in nature. Purists would not readily accept innovations in any art form easily. However, they come to be accepted by the majority of musicians and connoisseurs over a period of time. It is therefore believed that the innovations that are still being incorporated into modern western music compositions would be sooner or later accepted by the traditional musicians too.

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PERCUSSIVE SOLO

Sri B.M. Sundaram

Music concerts are profuse in our country. Karnatak Music is catered bountifully to all listeners, not only in South India or in the North, but also all around the globe, today. Music lovers of other countries have also started to evince keen interest in our system of music. Foreign students learning Karnatak music is also common now. Until about two hundred years ago, music recitals were confined to the temples, royal courts, the mansions of the nobles and religious mutts. Naturally, the number of listeners was also lesser, because, only invitees to music was mainly from the Samasthanas. It was a prestigious affair for every ruler or zamindar, to have a number of illustrious artistes, in his court. Dancing, devotional music and Nagasvara mela was fostered within the precincts of the temples, which were, again, under the control of kings or nobles.

In music recitals of those times, Mrudangam played the simple role of accompaniment, in the strictest sense of the term. Vocal or instrumental music that presents songs, dominated the performance and considered as the main or important. In fact, the percussions were not at all considered musical. For the same reason, there was never an opportunity, as far as we know, to any percussionist to play individually. His skill had to be exhibited only through the exemplary manner of his accompanying the main performer. Music concerts before the general public, came into existence, only about 150 years ago. During and before the times of the Musical Trinity, there were no public music concerts, since no authentic evidence is available to argue otherwise. Apart from the recitals held in palaces and mutts, the mrudangam was a regular accompaniment to dance and devotional music. When the Marathas came to Thanjavur, the art of Harikatha Kalakshepam also migrated there. Mrudangam was the stock percussive accompaniment, in those performances. Coimbatore Raghavayyar (1825-1876) is supposed to be the first musician to have given public recitals. Mrudangam also gained entry on to the concert platform, at that time, and

its role still was providing mere accompaniment, literally. To know about the advent of percussive solo - Tani Avartham - we must first look into the pattern of Harikatha Kalakshepam.

Harikatha is a great contribution of the Marathas, to the South. Patti Krishna Bhagavatar of Thanjavur, after his learning sessions and rehearsals, was engaged to provide vocal support, in the Marathi musical discourses of Morgaonkar Ramachandra Bawa, a Harikatha exponent. After thoroughly equipping himself with all the material, Krishna Bhagavatar started to perform Katha Kalakshepams in Tamil, while retaining the original format and types of songs, such as the Panchapadi, Sāki, Dindī, Ovi, Aryā, Abhang, Mattakokila,

Khadgā and so on. This earned for him the honorific 'Harikatha Pitamaha'. The format is like this: Panchapadi, Poorva Peetika, Nama Siddhanta and then, the main topic for the discourse. After Nama Siddhanta, the Harikatha performer would sing a Dhrupad, followed by a short spell of individual playing on the mrudangam, in the Usi tala (syncopated rhythmic beats). When Krishna Bhagavatar started performing Harikatha, the legendary Narayanaswami Appa used to share on the mrudangam and always played the 'solo', for about a minute or two. When he switched over to the concert platform, teaming first with Patnam Subramania Iyer, he, apprising the main artiste in advance, continued to play 'Tani' in every concert, as he was doing in Katha Kalakshepams. 'Sunada Bhoopati', 'Thanjavur Pakkiri, Tukaram, 'Jutkavandi' Bapu Rao, Doss Swamigal, all junior contemporaries of Appa, also kept up the tradition. Thus 'Tani Avrttam' - the percussive solo - in music concerts took its birth. Music performances of Karnataka had only Tabla, for rhythmic support until it was replaced by the mrudangam.

At its prime years of age, the 'Tani Avarttam' was simply playing phrases, short and sweet, in Sarvalaghu, with the help of Theka, Gumki, Chapu, Arai Chappu and so on. It ended with a 'Teermanam', which we now call a 'mohara'. Later, that is, about eighty years ago from now, arithmetic-oriented rhythmic passages came to appear, gradually. The credit of introducing them and also playing various Gatis, goes to the 'Laya Brahman', Pudukottai Manpoondia Pillai. He had other credits also. Ushering in the Khanjira, to the concert platform; the appendage of 'Muktayi' after the Mohara etc. It was only he, who trained Konerirajapuram Vaidyanatha Iyer and later, Kancheepuram Naina Pillai was greatly benefitted, in that specific area, by his association with Manpoondia Pillai. When only phrases in Sarvalaghu, were all along executed on the mrudangam, with colour and hue, why and how Manpoondia Pillai resorted to more mathematics? Perhaps, due to two reasons: (1) the melodic limitations of his own instrument - the Khanjira, and (2) some external influence.

Khanjira is a single-handed frame drum, which is able to produce only two sounds - Ta and Tom. Due to this limitation, it could not compete with the mrudangam, which has more pleasing sounds. Pitchwise also, it lags behind other percussives. To make it potentially competent, to win the appreciation of the audience and to elevate the status of the instrument, Manpoondia Pillai delved into the depths of rhythmic ocean. The second reason is, the external source. Brahmananda Paradesi, a musician-mendicant, with extraordinary proficiency in Laya Prastara, happened to be the mentor of Manpoondia Pillai. It was he, who threw open the doors of 'Laya Intricacies', before his 'chela', with a piece of advice to explore more and more. Manpoondia Pillai was further inspired by the Violin maestro, Iluppur Ponnuswami Pillai, maternal uncle of Taval Panchapakesa Pillai (Panjami). Since the sound produced on his violin was not at all pleasing, he adopted 'Vyavahara'. His swara prastaras were brain-teasers and knowledgeable listeners would comment and compare them to

the 'roasting of iron pellets'. Ponnuswami Pillai, as also, Manpoondia Pillai, took sustained interest in keenly observing the difficult rhythmic exercises, executed on another percussion instrument. Rhythmic feats are abundant there. Yes! It is the Taval or Dolu. The beacon light to other percussives, in the realms of rhythmic complexities, is the Taval.

Taval is an age-old percussive instrument, which took its existence, to provide accompaniment, only to Nagasvaram and was nurtured and developed in temples. It has no alignment of Sruti, like the Khanjira, if we say superfluously. Because, every sound has some pitch value, according to Physicists. Though the Taval or Khanjira are not perceivably in tune with the drone used in recitals, they are certainly in unison with some pitch. Any difference in this aspect is not clearly noticeable, because of their timbre. Valantalai - the right side - of the Taval should be in tune with Panchama, while the 'Toppi' should and could be tuned to Shadja. It all depends purely on the quality and make-up of the hide, the tensioning of the parchments and above all, the sruti sense of the player. Anyway, the Taval artiste has to display his talent, only by dexterously performing 'Laya Vyavahara'. That's why, the Taval play always starts in the Anagata Graha, which, all of you might have observed. Some seventyfive years ago, playing a solo on the Taval, was quite unknown. Any Nagasvara performance, begins always, only with the playing on the Taval, even before the actual commencement of Nagasvaram playing, for which, Taval is only an accompanying instrument and that has been the tradition, right from centuries. Though it could not be reckoned as a 'Tani Avarttam', it is certainly a percussion-prelude. In the course of his raga alapana, the Nagasvaram player would stop at some stage for a brief pause. Availing this interval, the Taval artiste would play for a while - Uruttu Sorkal or Farans, ending with a Mohara. It is called 'manodharma'. Manodharma, as we all know means 'imagination'. Any temple procession would generally start at about 8 p.m. and reach back, the next morning and Nagasvaram music would be there, throughout. By playing 'manodharma', the piper gets some rest. Similarly, when the deity, in the course of the procession, is stationed at any place for some time, Nagasvaram sounds and when it again moves, this wind instrument stops. But, the Taval player would usually play 'Nadaichol', at that time, while on the move. This is also a 'solo', though not exactly a 'Tani Avarttam'. Whenever Rakti and Pallavi are played on the Nagasvaram, the Taval player would repeat the rendering, with his own rhythmic language. We must bear in mind that in those days, a Nagasvaram group consisted of a single Nagasvaram and a single Taval. Even when playing Nagasvaram in duet was introduced by Tiruppamburam Nataraja Sundaram Pillai brothers, only one Taval player was in the troupe. 'Tani Avarttam' on the Taval commenced only during the days of Srivanchiyam Govinda Pillai (1863-1907). Since a nagasvara party consisted of a single Taval, the 'solos' never exceeded three minutes duration.

It was in 1902, two Taval artistes entered into an artistic duel, on the occasion of a function in the house of the then popular singer, Coimbatore Tavi. They were Ammapettai Pakkiri Pillai and Ammachatram Kannuswami Pillai. Pakkiri was the Taval player to Mannargudi Chinna Pakkiri Pillai and the other was a stock accompanist to Tirumarugal Natesa Pillai. These two Nagasvara groups were playing, one after the other, each for few hours. Sarabha Sastrigal, the flutist of renown, who was in the audience, prevailed upon the Taval wizards, to render a duet, in the 'Sawal-Jawab' type, so that everyone could enjoy such a 'novel' combat, with great enthusiasm. That was the first instance of Taval duet.

When my father, in his teens, was in the party of Nagapattanam Venugopala Pillai, he had to face challengingly, the great Vazhuvoor Muthuveer Pillai, but only on the compulsion of his mentor, Venugopala Pillai. That incident was an eye-opener to my father, as he used to narrate to me, later. This was the second occasion of a Taval duel. The third one was at Marakkadai, a village in Thanjavur district, the artistes being Karaikal Malaipperumal Pillai and Kavalakkudi Somu Pillai. But, all these were rare and occasional and not a regular feature. Addition of a second Taval or more in a Nagasvaram party and playing 'Tani' regularly with one or more Taval artistes - all these were introduced by my father.

In music concerts, Mrudangam was the sole rhythmic accompaniment, at the beginning stage. When Manpoondia Pillai brought the Khanjira, it was a welcome addition to the Mrudangam, though, the entire rhythmic display was led by the Khanjira. Then Umayalpuram Sundaram Iyer and Palni Krishnayyar, entered the stage with the Ghatam. Konakol, Mukhasankha, Dholak, Gettuvadyam and suchlike arrived, one by one. In the times of Naina Pillai, 'full bench concerts', comprising of many percussion instruments, became common. Beginning, in the early days with 'Sarva laghu' only, the pattern, now, is completely changed. More and more mathematical permutations and combinations entered into the percussions. Besides enjoying a full duration to play a 'Tani', many mrudangam players of the present time, utilise the pause between the Pallavi and the Anupallavi & the charana and manipulate mathematics, which are quite inappropriate. Mathematics has usurped aesthetics. Many mrudangam players have a misconceived notion that brain-teasing rhythmic gymnastics alone could win them great laurels. By doing so, the main artiste, on many occasions, has to be at cross roads and his imagination is impaired to a considerable extent, with the result, the total output of the concert is only a failure. Laya Vyavahara is of course, necessary. Palghat Mani Iyer, Pazhani Subramania Pillai and such other mrudanga Vidwans, of our own times, have also done them, but, never at the cost of aesthetic beauty. The very purpose of the mrudangam — suitably supporting the music and elevating the concert to great heights — has become a forgotten domain now. Sarvalaghu is only a vintage term to many. This is how the Tani Avarttam originated and evolved.

GLOSSARY OF TERMS IN THE PERCUSSIVE ART

Right from the earliest periods of the percussive art, a number of terms have seen in use. In the evolutionary process, many new terms, from various languages got assimilated. Many of them are familiar to us, since they are quite common. Unknowingly, some are used in wrong sense, in the present times. To review the glossary here, at least to some extent would be much help to everyone, interested in this glorious art. The terms pertaining to Mrudangam, Ghatam, Khanjira, Konakol, Mukhasankha, Dholak and so on are almost the same, as far as the playing pattern is concerned - except the names of the constituents of any particular instrument. For instance, the Mrudangam has a Valantalai - the right side parchment, Idantalai or Toppi is the left one; 'Karanai' also called 'Sādam' or 'Māvu', is the black coloured paste applied on the Valantalai and sometimes, on the Toppi also. These are all known to every music lover.

The Mrudangam used in dancing until some decades ago, possessed the name 'Muttu'. It would be tied on the waist and the player would handle it, standing or moving here and there. 'Muttu' is a Tamil word meaning a 'percussion'. 'Theka' is a term from the North and used for mode of playing 'Tadhin dhinna' or 'Nadhin dhinna', mainly on the Vettu Tattu of the Valantalai, combined with the Toppi. It is an important style in playing 'Sarvalaghu'. 'Chappu' is producing the tonic sound, by striking at the Vettu Tattu and on the first half portion of the circular Karanai. This is in tune with the Shadja. A partial 'Chappu' is played at the other half of the Karanai and on the farther end of the Vettu Tattu, which secured the name, 'Arai Chappu', 'arai' meaning 'half'. It is mainly used for executing 'Talāngu'. Keeping the fingers curved and softly handling the Toppi, is called a 'Gumki'. It requires no striking at all. The sound produced resembles the cooing of pigeons, which, in Tamil, is called 'Gumaittal' or 'Gumaippu'.

'Faran' is a term from Urdu, meaning 'rolling down in speed'. Syllables that are played at an incredible speed, which resemble the sound of a Jet plane are called 'Farans'. 'Arudi' is a commonly used term to indicate the end of the Poorvanga - first part - of any Pallavi. Scholars say that the word 'Padagarbha' is equivalent to 'Arudi', which, in Tamil, means 'boundary', the 'limit'. In Mrudangam playing, the term 'Arudi' is used on two occasions, above all. At the conclusion of a Percussive solo, the main performer takes up the song and finishes it. The percussion follows and ends it in the same or the next avartha and this is the 'arudi'. In Bharatanatya recitals also, after executing every 'Khandika' or part of a Varna and while coming back to the starting point, the dancer, in unison with the Muttu or Mrudangam, ends that portion with an 'arudi'. 'Teermanam' is rendering syllables, as a short finish, so as to make everyone know, that particular section of the song is over. This, again,

is a Tamil word and the Teermanam is always used at the end of the Pallavi or Anupallavi and before the Anupallavi or Charana, as the case may be. Tradition enunciates that a Teermanam should confine within the limit of half or three-fourth of the tala cycle.

'Kovai' or 'Korvai' is a cluster of rhythmic syllables, rendered in sets, one after another, thereby increasing its length. It is a process of progression. This Tamil word came into use, to indicate the characteristic of such a passage that is stitched more and more and consisting of a finish.

(Kōrttu Kōrttu Amaivadu Kōrvai). According to the tradition, a Kōrvai should be in three tala cycles or three fold. 'Mummadikkovai' is the word mentioned in ancient Tamil literature. 'Mumjadi' means 'three fold'. Tolkappiyam, the earliest available Tamil Grammar, dating between 6805 B.C. and 6730 B.C. gives a sutra: 'Isaippadu Porule' Nāngu Varambāgum - Viraiṣol adukke moonidru varambāgum — Musical passages are in four cycles; layers of rhythmic passages — the Korvais — are in three cycles'. In the percussive solos, after the initial 'thekas' and other patterns, one or more Korvais, are played, by way of developing the Tani avartham. It may either be in the same gati, in which the solo is commenced or in other ones also. It is not uncommon among percussionists, to mention the appendix to a mohara, as a Korvai - 'concluding with a mohara and Korvai'. In fact, the appendice is only a 'Muktayi' or 'Muttaippu' and not at all a Korvai. Korvais were existent, even before the appearance, of 'Muktayi'. Perhaps, due to the nature of such a muktayi being threefold or in three avarthas, similar to a Korvai, this error might have crept in.

'Mohara', in Marathi language, means the 'crest' or 'peak'. The climax or the peek of a Tani Avartham is the 'mohara'. 'Moharam' in Arabic, denoted the head. That is why, an insignia of a head - that of the martyr, Hussain - is carried out in procession, during the Muharram festival, by Muslims. In Tamil, this word has 'the face', as its meaning. The percussive display is the body, while the finale - the Mohara - being the face or head of it. Some Yakshaganas of the Thanjavur Nayakas' period mentions the term 'mohara'.

In the Modi records, written during the regime of the Marathas, 'moharam' has been given, while mentioning about the reward to one Kamakshi Boi, for her exquisite mrudangam playing. Probably, she was the first lady-mrudangist. Mohara was the finale of a Tani avartham, until the 'muktayi' was introduced by Pudukottai Manpoondia Pillai. Whereas the Teermanam has to be rendered within half or three-fourth of an Avartha, mohara extends to four avasthas. It consists of two parts - the mohara main for two cycles and its reduction, called 'Kuraippu', for the next two avarthas. This is a conspicuous difference between a Teermanam and a mohara. A Teermanam had no place for 'Kuraippu'.

'Muktayi' takes its root from 'mukta' - the finality' the release. In Tamil, the word 'Muttaippu', again from the same root, means 'putting an end'. In Tamilnadu, the term 'Tadhinginatam' is mostly used for 'muktayi' - a 'mohara and Tadhinginatam', may be, because the main constituent of a muktayi is 'Tadhinginatam'. Sometimes, it is also indicated as 'mukutam' - the crown.

Almost all the playing methods on the Tannumai, the early Tamil name for mrudangam, have been ascribed names in very ancient Tamil literature. It would only be relevant to mention at least a few, here.

Playing the syllables 'Kitajam', by prefixing it with some others in progressional order like 'Kitajam, Ta kitajam, Dhittā kitajam, Taddhittā kitajam' - in Srotoraha yati, has been termed as 'Erukai' (ஏறுகை). 'Alagam' or 'Tira' (அழகமுதிரள்) is the term mentioned for rendering syllables in medium fast speed - Uruttu Sorkal. Going on adding the syllables 'Taka' like 'Taka Taka Taka', 'Anuvālam' (அனுவாலம்). Playing 'Talāngu' has been reckoned as 'Chengai' (செங்கை). Executing syllables in high speed, sounding like that of a jet plane is called 'Ari' (அரி). Producing any sound to give a dramatic effect is 'Alārppa chālī' (அலர்ப்பச்சாலி). Giving pauses in between - Karvai - has been mentioned as 'Vittalām' (விட்டாலம்).

In the field of Taval, all the terms used for the mrudangam playing are found, while it has its own additions. 'Anusarippu' 'Anusarippigai' is keeping the tempo constantly, while a raga alapana is in progress. 'manodharma' is a short percussive interlude, during the pauses in the elaboration of a raga, on the nagasvara. 'Jati' is a rhythmic structure, always, necessarily ending with 'Kitathaka tarikita thom', which came up from the dancing and adopted by the Taval. 'Alarippu', 'Nadaichol' and many others are also there. The constraints of time prevent me from going in detail, about the full glossary, current in the percussive art, and, moreover, it would be fitting, if only they are practically demonstrated, with the help of a Taval or Mrudangam. I shall take the next opportunity, if provided to do that extensively, in the way I want to present it.

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TALA VADYA TRADITION IN KARNATAK MUSIC

Sri T. Sankaran

So far as I know the mrudanga vidwan or the tavil vidwan has been treated with the affection and regard for Cindrella until the Prince charming Mani Iyer gave his blissful kiss! In the Nagaswaram (and today in Clarinet band) invariably as a rule the tavilkarar draws the first blood even before the strains of the pipe are heard, for the tavil keeps the chatuasra beats even for Raga alapana. If ever the party were garlanded the Nagaswara Vidwan is entitled, he should be honoured first (mudal thaamboolam) the distinguished accompanist. His proportion was fixed say at 20% of the Nagaswaram vidwan's fee until AIR introduced Grading and equal fee for A or B grade based on merit not the instrument. The time keeper (talam) (and the Ottu piper) got a pittance. The later day institution of 'special tavil' evidently from the days of Nidamangalam Meenakshi Sundaram Pillai, the bargaining strength has enhanced the fees but it is doubtful without authentic data if NTM Pillai or Panjami, the uncrowned king received equal fees as Rajarathnam Pillai or Thiruvizhamizhalai Bros. Let us note here that all the artists in this ensemble belong to the traditional professional class.

The older photographs contain the picture of a single tavil vidwan per band even when there were two pipers (brothers) in the party. Today the minimum regulars are two tavils with addition of special tavil at times.

In ritual music, the kidukatti, the conch, the edakka has their special place in nagaswaram concerts for Laya Vinyasam.

MUSIC CONCERTS

Let us consider music concerts: Vocal & Instruments.

The mridangam vidwan was the lord of all he surveyed except for an occasional addition of a Ghatam. This could be seen in the picture where Pandi Dorai of Ramnad is seen with Maha Vaidyanatha Iyer, Narayanasami Appa & Umayalpuram Narayanier and violinist. The kanjira was a later addition by the pioneer Manpoondiya Pillai for Konerirajapuram Vaidyanatha Iyer's concert. Palani Subramanaya Pillai had to plead at the Music Academy for inclusion of the instrument and that it should not be eachewed because it cannot be tuned like a mrudangam. The china katchi concerts on 5.1.1915 at Thiruvaiyaru mentions Muthiah Pillai (Mrudangam) and Manpoondia Pillai (Kanjira). Then came Nayana Pillai with his Full Bench concerts of Navagrahams: Nayana Pillai and Sishya: vocal, Govindasami Pillai: Violin, Alaganambi: Mrudangam.

Dakshinamurthy: Kanjira, Sundaram Iyer: Ghatam, Venu Chettiar: Dholak, Sitaramier: Morsing, Harihara Bhagavathar: Gethu vadyam, Pakkiri Pillai: Konnakkol. There used to be a Jalra player also in some concerts. I think it was Gopalier. Ladies had just mrudangam and or ghatam. Today full bench for Ladies are common.

Tavil as an accompaniment to Vocal and Violin is also becoming common. Dance had only mrudangam and cymbals and konnakkol of the nattuvanar. Today there is Tavil and also full bench with Thimila, Sudha maddalam, Edakka etc. Tabla in concerts by ladies was encouraged by Dhanammal; Jayamma was taught Tabla specially for this purpose.

A word about the Tala Vadya tradition in Karnatak music may be relevant. "Sogasuga Mridanga Tala Dheerudu" considered and worshipped – Yes worshipped – tonight is Palghat Mani Iyer – Association of ideas triggers off memories of other "Madala Tala gatulau delisina Mahaanuhaavas" and with the bard of Thiruvaiyaru let us sing in chorus with him "Andariki vandanamu". In the mrudangam line of succession we have necessarily to start with Nandi maddalam thatta, Naaradar vazhum thookka, thom thom enrayyan (Ayyan: Brahma) Thalam Sruthiyodum thookka Rasikas to remember several mridanga vidwans and tavil vidwans drape their instruments. With Nandikeswaran symbol embossed on velvet covers. It has been my privilege to watch Nayana Pillai and Ariyakkudi Ramanuja Iyengar sing this Yadukulakambodhi piece with their index figures pointed towards Dakshinamurthy Pillai and Mani Iyer respectively during kacheries. In the Govt college of music, the mrudangist in Madurai Mani's concert was Palani Subramanya Pillai. Principal Musiri proposing a vote of thanks to the musicians observed about Palani; 'We have the privilege of featuring on our concert tonight Nandikeswara – of course, with the Tail!

In recorded history the earliest mundane Nandikeswara known to rasikas is Narayanasami Appa. A few other were Tukaram, Das Swami, Mylattoor Krishnaiyer, Ramadas Rao, Alaganambi Pillai, Vaidyanatha Iyer, Dakshinamurthi Pillai, Muthiah Pillai, Kuttalam Kuppuswamy Pillai, Chattapuram Sibbier, Sakkottai Rangu Iyengar, Tirunelveli Gomtinayakam, Sivavadivel, Venu Chettiar, Venu Naicker, Tirugokaranam Ranganayaki, Umayalpuram Sivaraman, Raghu, Karaikkudi Mani, T. Sankaran, T. Ranganathan, Akhileswarier, Ashwadhati Ramamurthy, T.M. Puttaswamiah, Ramabhadran, Muthusami Devar, Tanjore Pakkiri.

Earliest among known Ghatam vidawans are Palani Krishna Iyer, Umayalpuram Narayanier, Sundaramier, Alangudi Ramachandran, Vilwadri Iyer, Manjunath, Kodandaramier, Madras Devarajulu and today Vaidyanathan, Bangalore Venkataram, Vinayakaram, Narayanaswamy, Palghat Sundaram.

Manpoondiya Pillai, Dakshinamurthy pillai, Palani Subramanya Pillai, Zamindar of Sathur, Swaminatha Pillai, today - Nagarajan, Ramachar, Harishankar are the kanjira vidwans. Manpoondiya Pillai, kanjira found the comity of concert Tala Vadyas but it was excluded from Madras music academy concertts until Palani later appealed to the Experts Committee for its inclusion.

Memorable names

Dholak: Nannu Mia, Venu Chettiar. **Konnakkol:** Pakkiri Pillai from the days of Naina Pillai and his son Prof. Vaidyalingam Pillai. **Morsing:** Adichapuram Sitaramier, Natesa Pillai, Pudukkottai Mahadevan.

Gethu: Harihara Bahagavathar, Harihara Sharma, Subramanyam, Venkataram.

Talam: Goplier?

Dance: Alaganambia Pillai, Kuppaswamy Mudaliar.

Tavil: Shanmuga Vadivel, Yazhpanam Dakshinamurthy, Valayapatti, Tiruvalaputhur, Panjami etc, Nachairkoil Raghava Pilai, Valangaiman Shanmuga Sundaram.

Kidukotti, Sudha Maddalam, Edakkai, Conch etc., ?

Five hour traditional concerts had shrunk to 2 1/2 hours in Sabhas and to 1 1/2 hours in broadcasts but stil Tani is out of proportion even after separate provision has been made for wireless Tala Vadya katacheries. Old Talas have come out of text books for concerts in festival series, for 24 hour brodcasts need variety. Audiences have exploded and foreign audiences appreciate LAYA more than MELODY. Laya vidwan who asserted his individuality only during Tani now asserts his equality in Status, Fees, SNA Titles and Honours.

Appreciation is different from understanding. Newspaper courtesies do not review Laya as vividly as they do melody Laya is still a mystery apocaryphal. With Laya as its backbone, Dance has exploded but neither the dancer nor the rasika knows or can understand the grammar of a theermanam. It is a closely guarded secret by the Nattuvanar. The chorists grope for the eduppu at the close of a theermanam.

Tani in Bharathanatyam is now a forgotten tradition. I have heard Tani - I think after Mela Prapti as Laya is the backbone of Dancing.

So it is in the katha where Mridangam and jalra have the upper hand.

Duration

Mani Iyer maintained that the duration of a Tani beyond ten minutes would bore the audience. Evidently it is about the mridangam tani but not Tani by ensemble or the Tavil tani. Tani is the resting point for the Principal;

the drummer becomes Principal during this period after having served as handmaid as accompanist.

Maharajapuram once ignored the mridangist and denied a tani. As the concert was about to close the mridanga vidawan dropped a polite hint claiming his pound of flesh. Unfortunately he rubbed Maharajapuram on the wrong side who was sore that the Mridangist was anything but cooperative. He looked a sessionist ploughing a lone furrow divorced from the mainstream of the concert. In that sense he was 'thani' (lonely). With characteristics sarcasm Maharajapuram met the demand for a tani with the observation "Why Sir, you have all along been a law unto yourself and playing tani leaving me alone 'tani!' Maharajapuram clinched the issue by rounding off the concert with Mangalam.

There are unwritten codes of Katcheri dharmam; the main performer is the central figure with the Violinist/or Vainika/or Flutist to his left and the mridangam to his presuming that the accompanists are Right hands. If they are to be garlanded the identical protocol holds good. Fifty years ago, society ordained this protocol in accordance with the hierarchy caste. Morsing Sitaramier and Ghatam Sundaramier claimed the garland first but in relation to their age, then the Vocalist Nayana Pillai, Fiddle Govindaswami pillai, Mridangam Alaganambi Pillai. But in respect of Fees, the main performer 100; the violin about 60% and mridangam about 40%

In the kathas the Bhagavathar as a rule was honoured first, the profession being the monopoly of the Brahmin males. In dance, the danseuse would see to it that the teacher was honoured first.

In concerts the mridangist as a rule accompanied the Main performer and the upa tala vadya Ghatam and Kanjira accompanied the violinist. The Konnakkol dominated the concerts of Naina Pillai and in the Tani the koraippu the lead was, as a rule, taken by Pakkiri Pillai where both seniors were on the stage Dakshinamurthy.

The Karnataka Sangitha Tala Vadya tradition has to be considered in relation to (1) the Vocal or instrumental - Veena, Violin, Gottuvadyam and flute katcheri (2) The harikatha ensemble (3) The Nagaswaram band/Clarinet (4) Bharata Natyam

1. Vocal, Veena, Gottu, Violin, Flute concerts - the last moved up to principal status from just an accompaniment.

The percussion was the privilege of the Mridangam with its inherent capacity to be tuned. Pictures of Maha Vaidyanatha Iyer and Patnam Subramanya

Iyer include photos of mridangm Narayanaswamy Appa and ghatam Narayana Iyer. Be it noted that all the Musicians do not belong to same caste.

There were female contemporary musicians and we may not be far wrong in presuming that only the two percussion instruments were used in the concerts. The female vocalists all belonged to the professional caste and the percussionists mostly belonged to the same caste.

There was the prejudice to women particularly devadasis and accompanists from the same posed lesser problems. The ladies specialised mostly in singing compositions without raga swara elaboration and their music used to be sneered at as: "parrot - like female music sans imagination". Female mridangists or ghatam vidwans were unheard of. The profession and ladies either sang or played veena and no other instrument; of course they danced. Katha was the monopoly of brahmin males until C. Saraswathi Bai a Brahmin lady gate-crashed into their ranks. The Mridangam was the real back bone in the Tanjore style characterised by Ezhdi talam, oosi (ஏழடி தாளம் ஆசி) and Arai Chappu. Every top ranking drummer from Appa to Ramdas considered it a privilege to be a member of the Katha ensemble rather than other katcheris. The Tanjore style of drumming was a leaf from the Maharashtrian tradition of Bhajans and Kathas for propagation of Bhakti. The other instruments joining hands with the Katha Mridangam were the brass cymbals, the brass anklet, and the wooden chipi. The compositions that lifted were the salai & Dindi, Hovi, Abhang which helped enjoyment & entertainment with a bang while narration helped understanding the canonical literature.

Dancing, a temple ritual called for a different approach to drumming and as it evolved into a secular entertainment for stered vigorous drumming clashing in coordination with the Nattuvanar's cymbals and dancer's ankle bells and konnakkol executing Teermanams which accommodated simultaneously the vocal music in the vilamba kalam, the drummer's beats at higher speeds and the cymbal-beats and dancer's steps executing nadai bhedams - all simultaneously with a chastic density of laya - Tanjore Bani again of the Ponnai brothers.

M.S. Ramaswamy Iyer writing in 1920 deplores the fall of Karnatic music tradition when the subordinate role of Narayana Swamy Appa's mridangam interior to 1920 came to be superseded by tadiginathoms of Manpoodiya Pillai & Dakshinamurthy Pillai for jaw-braking pallavis. We have not heard of a competition between N. Appa and another percussionist.

The ladies of these days had their own permanent set of accompanists, well rehearsed and co-operating with the vocalists. They sang only compositions unlike the males who sang Manodharma sangitham in competition with accompanists. The mridangist as a soloist playing Tani was the Principal musician at least for the duration of the 'solo'. The Tani with other percussionists was a competition. Be it noted that the concert artists here are not of the same traditional caste.

Mani Iyer in his address prescribed a time limit of 5 to 10 minutes. Semmengudi thinks that only from the Mani Iyer era the audience sits through the Tani instead of visiting the canteen or the soda fountain.

THE ROLE OF TALA VADYAS IN CARNATIC AND HINDUSTANI MUSIC: A COMPARATIVE ASSESSMENT

Smt Sakuntala Narasimhan

One of the basic differences between Carnatic and Hindustani music is that in the former, vocalist mark tala cycles with their hands, whereas vocalists in Hindustani music do not mark tala in this manner. They depend on the tabla to mark the rhythm cycles through standard *theke* patterns which the musician is expected to recognise by ear (even if he is not a tabla player) in order to identify the *sam* (beginning point or most important stressed point) in each cycle. In the case of Hindustani instrumentalists also, this is true, whereas with south Indian instrumentalists, even if they are unable to mark tala with their own hands (because their hands are engaged in playing the instrument, as in the flute or violin), it is common to have some one else showing the tala by hand, for the convenience of the instrumentalist. In the case of a veena player, the subsidiary strings are used to mark tala, but this too calls for an in-built sense of rhythmic cycles, hence veena artistes too employ the assistance of another person to mark tala.

The role of the tala vadya (mridangam, ghatam, kanjira etc) is therefore mainly one of following and embellishing its rhythmic patterns with matching phrases on the percussion. A percussionist can do this well only if he (or she) is conversant with a large repertoire of *kritis* (which he can then accompany well anticipating the sequence of *sangatis*, or *chittaswaras*, etc).

In the case of Hindustani music, it is the other way round - the musician has to be conversant with the percussion sounds and patterns in order to be able to recognise the *sam* and coordinate his own improvisations with the appropriate beat. The tabla does not follow the music but provides the rhythmic base on which the main performer is dependent. Since tala is not marked by hand, the tabla *theke* is the only means of keeping track of the tala cycles. The percussionist therefore confines his improvisations only to those short snatches when the main performer is not himself improvising but is repeating the basic melody line for a few times till the tabla has finished its rhythmic improvisation.

A *tani avartanam* in the Carnatic system is performed without music; only the tala is marked by hand, by the main artiste, whereas in Hindustani music a tabla solo can be played only if there is a basic melody tune, set to one cycle (*chakkar*) of the tala, repeated endlessly on some musical instrument. The tune then provides the percussionist with the beginning point for his variations.

A Carnatic music recital can take place without a percussion accompaniment but a Hindustani classical recital cannot take place without the tabla because there is no other conventional way of keeping track of tala.

Because of this difference, there is a difference in the mental approach of a musician in the Carnatic and Hindustani systems respectively. Even if he is a lead performer, his dependence on the percussion instrument is greater in Hindustani music than in Carnatic music. Hindustani music thus calls for a strong in-built sense of tala cycles and at the same time requires the artiste to set apart a portion of his attention to keeping track of the tala cycles.

A percussionist of the south who is playing only the basic tala rhythm could be considered lacking in the ability to embellish the music which he is providing accompaniment for. A tabla artiste who does not play the basic theka, on the other hand, could be considered unsuitable for accompaniment, even if he is a top-notch artiste.

-oOo-

The role of the tabla in the Hindustani system is to keep track of the tala cycles and to provide a rhythmic accompaniment to the main melody. The tabla is played in a way that it is always in tune with the main melody and it is always in the right place. The tabla is played in a way that it is always in tune with the main melody and it is always in the right place.

In the case of Hindustani music, it is the other way round. The tabla is played in a way that it is always in tune with the main melody and it is always in the right place. The tabla is played in a way that it is always in tune with the main melody and it is always in the right place.

A tabla is a small drum that is played with the hands. It is played in a way that it is always in tune with the main melody and it is always in the right place. The tabla is played in a way that it is always in tune with the main melody and it is always in the right place.

KONAKOL

Gurukrupa

Is an art, among others, which concerns with 'Laya Vyavahara' (intricate rhythmic manipulations) that enjoyed not only an important, but the foremost place among percussive instruments in concerts of Karnataka Music. The term 'Konakol' is today prevalent only among those who know about it, who have listened to it, though, the very art is almost obsolete.

In Tamil Language, it is common that many assigned names are, in fact, causal. The assigned name 'Konakol' means 'orally reciting the rhythmic solfa syllables and phrases. The word 'Koni' or 'Koniyaadu' in Telugu, also means, 'to say', 'to recite'. Many words belonging to anyone of the Dravidian Languages (Tamil, Telugu, Kannada, Malayalam etc.) commonly gain currency in another language of that group. The Telugu word 'Koni' had been adopted in Tamil and thereby 'Konipittal' became the exquisite art of reciting syllables pertaining to the sphere of rhythm. Everyone would know the Nattuvanar's oral recitation of Jatis and Sollukattus in any dance programme. Whichsoever be the percussion instrument, the Jatis, Korvais, Moharas and so on are played, only after composing them vocally and correcting them, if need be, earlier. This is the practice even in primary lessons. The term 'Kol' means 'rule' or 'reign'. The Tamil maxim 'Kudi Uyarak Kol Uyarum' speaks about the rule of the king. By way of vocally reciting syllables and phrases that manifest rhythmic intricacies, the art of Konakol came to be considered as the 'King of all other percussive instruments', and thus the name is purely causal.

Every Language has many dialects. Rhythm is a universal language. Taval and Mrudangam or the Jatis and Teermanams employed in dance, have their own dialects. Likewise, 'Konakol' also has its independent dialect, innovated by artistes, who have equal and extraordinary proficiency in these arts. Taval and Mrudangam are the two percussive instruments that have acted as the harbingers in the development and improvisation of mathematical permutations and combinations, with the help of syllables and phrases, based on the edifice of laya, though, as instruments, they have their own limitations. The syllables rendered on the Taval, cannot be produced in the same manner or with the same tonal colour on the mrudangam and vice versa. On the other hand, it is quite possible to execute in Konakol, both, in very dexterous manner.

Ghana and Naya (Vallinam and Mellinam) in sound is a common requisite for all categories of music and musical instruments. This factor is apparent in Taval to a considerable extent, but, in the present day mrudangam playing (barring that of a few), it has to be traced only microscopically. Konakol, possessing these tonal variations to a great extent, is one art that exemplifies

the beauties of Laya with superb grandeur and graceful elegance. It may, as well, be compared to the elegant gait of the elephants (Mattagaja) during the 'Arattu' rituals of Kerala. The fortunate ones, who have listened to Konakol, in its true form and colour, would know and feel, how gracefully Konakol and Vocal music gaited, hand in hand, particularly during Neraval and swaraprastara. Due to sheer ignorance or to some sort of prejudice, some may describe it as a 'battle between two or more on the stage'. It is neither a fight nor a wrestling sport, but only the grand, graceful and elegant gait of two great elephants. The fantastic art of Konakol has brimful of beauty graded in elegance.

It may well be observed that a discipline, during the orchestral presentations of Western Music, is strictly maintained as to which instrument should play what portions and when to be silent. The pieces already composed by someone are presented there and hence no question of improvisations on the stage. On the other hand, our Karnatak Music provides unlimited scope for improvisations, even while the concert is in progress, though, there is also a discipline, with regard to the participation of instruments, almost akin to Western Music. When rendering music with tala, the possibility for copious and imaginative out-pour is there, but, to maintain a discipline, to control and lead the percussive instruments, by way of making them either to join or to be silent and to make the total concert a great success, is the prime responsibility of Konakol. When this art began to fade away from the concert stage, the discipline purported to be adhered, also started to vanish, proportionately. People are never interested to listen to music that has no such discipline, the result being the number of listeners for Karnatak Music gradually dwindled. Naturally, they stride away in pursuit of some other musical varieties, in which a discipline is quite conspicuous.

A Konakol artiste need not render to the 'time' kept by others. Vocal music and konakol are the only two arts, that are not at all dependent of the 'tala measure' counted by anyone else. It is Nature's boon to them. Above all, only because the composition or the lyric (sahitya), for that matter, is orally rendered, Vocal music acquired the first place and occupied the central seat on the concert dais. Similarly, by reciting the rhythmic passages vocally, Konakol gained the first and foremost seat and place among percussives. There is a verse in Tirukkural, "Solluga Sollai Piridor Sol Acchollai Vellum Sol Inmai Arindu". True to the idea of this verse, Konakol is a sophisticated art of high order, based on 'Sorkal' (syllable), which can never be subdued or defeated by any other percussive rendering. Since rhythmic nuances, soaked in intricate mathematical calculations are vocally picturised by it with extreme elegance, Konakol deserves every legitimate right to occupy the front seat on the platform and to begin the laya vinyasa, leading other percussive instruments. With cogitative consideration of all these, our forefathers established this tradition and sincerely adhered to it.

Regarding the birth of Konakol, it is impossible to say when and by whom, the art came into existence. From time immemorial, reciting Jatis for dance is there. As such, we may rest assured that Konakol took its birth, simultaneously with the appearance of dance and other percussive instruments in our land. Some names like Ekambara Iyer are associated with this art, though, the credit of ushering it on the music stage is due only to the leonine Mannargudi Pakkiri Pillai.

Born in 1867, as the son of Chockalingam Pillai, Nattuvanar and the co-brother of Sivanandam (one among the Tanjore Quartette), Pakkiri Pillai learnt Nattuvangam from his father and then Taval from Swarnam Pillai. With profound mastery in both these, he gave a new orientation to the art of Konakol, with a dimensional hue. Layagnana with anchored precision was a God-given-gift to him and he was adored as 'Laya Simham' and 'Laya Churangam', by eminent Pallavi maestros of the day, like Konerirajapuram Vaidyanatha Iyer and Kancheepuram Naina Pillai. Pakkiri Pillai was a true personification of the Tirukkural verse: "Solal vellan sorvilan anjan avarai igal vellal yarkkum aridu". This non-pareil laya wizard passed away on 2-11-1937, leaving behind his cherished treasure of art to his son, Vaidyalingam Pillai (B: 20-9-1900 — D: 27-1-1974). This illustrious son fostered the art of Konakol, steadfastly following the footsteps of his great father. The concerts in which Pakkiri Pillai and later Vaidyalingam Pillai took part, were sumptuous feasts to listeners. Some others also handled this art, such as, Mannargudi Arumugam Pillai (who later switched over to Khanjira and Vocal), Vellore Gopalachari and Dharmapuram Abhiramasundaram Pillai (his main career was Nagaswaram), to name a few. All the above artistes secured a high status to Konakol.

The justified tradition, propounded by the perspicacious elders, allots the front seat and first participation among the percussives, to Konakol, since it exhibits the grammar of laya language vocally, with three tonal variations Valivu, Melivu and Saman in a fitting manner and on the appropriate occasion. Age and experience of the Konakol artiste were not given credence and he, for the same reason, was never pushed to a remote corner on the dias. The placement (sthāna) is due only to the art and not for anything else. Suppose, let us say, a boy of ten years gives a vocal recital and accompanied on the mrudangam by seniormost veteran. The mrudanga vidwan, by virtue of his age, seniority and experience is never offered a seat at the centre of the stage. He could neither demand that the boy should commence singing, only after the mrudangam begins to sound! The custom of giving the due front seat and regard to Konakol was widely honoured by every musician. This state of affairs changed, by the passage of time and for various other reasons. There are no Pakkiri Pillais and Vaidyalingam Pillais. Patronage and encouragement to Konakol became diminished. Vocalists who have the ability and talent to sing with Konakol have also become lesser in number. Many others do not know how successful the concert would be, if Konakol also takes part. It is not so

easy to sing with Konakol; the vocalist should never get confused nor jumbled, while Konakol is recited and essentially should have a perfect layagana. When the art of Konakol slipped out of the musical scene, for want of necessary patronage, the vocalists have also been deprived of opportunities to sing with Konakol.

Mrudangam has an essential role in music concerts. May be due to the same reason, Konakol got neglected, eschewed and pushed away with disdain, towards the grave. "Music concerts could be held without konakol; but, could there be any without a mrudangam?"- someone whose head is loaded with egoism and heart with odium may advocate with such an argument. There are many stalwarts who have experimented and proved that concerts are successfully possible without the so-called 'inevitable' accompaniments-the violin and the mrudangam-either substituting with other instruments or even without any. Veena and Gottuvadyam concerts have been performed only with Ghatam as the percussive accompaniment. Khanjira may also be there or not. The question is not, which accompaniment one should have. When two or more rhythmic accompanists are engaged, What should be their seating arrangement what should be played by whom and when, are the factors in real question.

To perform a laya vinayasa, in combination with Konakol is also a bit difficult. When an apathy is shown to Khanjira and Ghatam, in the present times would it be necessary to describe the pathetic state of Konakol? Vainglorious pride and egoism have cultivated a notion in the minds of people that mrudangam is the only important instrument for a concert and so, only mrudangam should commence and lead the percussive ensemble. The role of konakol got usurped.

Many musicians of this day, would not have had the opportunity to listen to the performances given by Kumbakonam Azhaganambi Pillai, Pudukottai Dakshinamurthi Pillai, Thanjavur Ramdoss Rao, Palani Subramania Pillai, Palghat Mani Iyer and such other mrudangam maestros, sharing the Laya vinyasa with Konakol. Hence, they may not be knowing how much respect and regard, the aforesaid masters gave to Konakol and also about the placement of the Konakol artiste on a concert platform. Lack of knowledge resulted in a launching with rancour to pillage Konakol. But, who would say that it would only be right to slaughter the age old tradition, nurtured and handed down by the great artistes of yester years? Musicians may have wide popularity and 'most sought after'. Everyone would agree that egoism, self-projection and a tendency to dominate should never be given room to spin a web of cataract and cripple the sight. A stigma towards Konakol has led to the strenuous effort to do away with it. Many are blind to the fact that seat and respect are only to the art and not to the age or calibre of the performer. Reciting solfa passages

is the mother of all percussive arts and now, she has been disregarded, alienated and necked out on the streets!

Some organisations ballyhooing that they are the preservers and promoters of art, but actually with a commercial motive, do not care even to recognise that there was and is an art, by name, Konakol. They are obligatory to the advice and guidance of some prominent members of the musical fraternity, whom they are after, to fill up their boxes. It is quite natural that they are careless about the time-honoured tradition and the greatness of an art, since their collection purely depends upon some prominent artistes. It is a matter of surprise to note that an institution, clamouring that it has dedicated itself to the cause and promotion of Fine Arts, had gone to the extent of passing a dolorous resolution, not to accommodate any 'Upa pakka vadya' like Khanjira, Ghatam and Morsangu, in the concerts annually arranged by it. How precarious would be the plight of these artistes! When they approach the organisers requesting for a 'chance', they are welcomed by the impish and mendacious impressarios with the stock reply that the vocalist prefers to have no 'upa pakka vadya'. When the vocalist is contacted, he would puckishly say, "I have no objection, provided the mrudangist agrees to it". The mrudangam player, for his part, may well have some other excuse. All these have become a routine affair in the 'Music Market'. If condign opportunity and encouragement are not extended to these artistes, who have, with great difficulty learnt their respective arts and are solely dependent on their career for their very survival, what would be the fate of these arts? What then is preserving and fostering of arts? Who will come forward to learn them? What then is preserving and fostering of arts? Is it by closing the doors for them, with shameful resolutions?

There are many Khanjira or Ghatam players today, but those who perform Konakol are very meagre. Is it not necessary to encourage this art and save it from the pangs of death? Patronage to it is not by offering an opportunity, once in a blue moon, and also scheduling it to a corner on the platform. The idea "Alright! You wanted a chance; recite what you may and get off", should not be in the mind of the organiser or fellow-musician. Ample opportunities, due respect and placement to the artiste, honouring the worthy tradition for the sake of art would be the real encouragement. Konakol is already at limbo and pushed into the grave: it awaits a blackstone to be laid upon for an eternal closure. It is high time and the responsibility of musicians, the mrudangists, in particular, and of the organisations, that have sincerely devoted to the growth of of Fine Arts, to revive and resuscitate the grand old art of Konakol-the mother of all percussive arts- that had, ever since its birth, played the foremost and pivotal role in projecting rhythmic intricacies, the backbone of our Karnatak Music, in graceful and elegant manner.

VALEDICTORY ADDRESS

Sri R.K. Srikantan

Sangeeta Vidwans, Rasikas, Musicologists, Ladies & Vidushis,

It gives me great pleasure to be in your midst today and deliver the valedictory address of this seminar on Talavadyas conducted by the Percussive Arts Centre, Bangalore. I thank Vidvan Bangalore K. Venkataram, Director of the Centre for having given me this opportunity. The Percussive Arts Centre has been doing yeomen services in the promotion and dissemination of greater awareness and the knowledge of various aspects of percussive arts and instruments among musicians, scholars and rasikas alike. This seminar is intended to be a part of the continuing services to the music loving public as well as to classical music that the Centre has been rendering all along.

We Indians revere the great tradition of our music and musical instruments. It is the pride of Karnatak music that it is Cent percent indigenous, splendid in its distinct individuality and backed up by a vast amount of theoretical and scientific speculation spanning the centuries. The forms that prevail in our music currently were evolved about 500 years ago, in a different environment and atmosphere. They were born under the shade of religion, and nourished by temples, palaces and the spiritual atmosphere at homes. Its progress is marked by a steady transition from crudity to refinement, from formlessness to structured beauty. Music developed as a part of the life of the people bound by its morals, ethics and also the codes of living, reflecting the mind and mood of those times. The art which evolved thus has to face now the conditions of this century and satisfy its needs. It has to face the changed moods. The conventional orthodox type of musicians are too often apt to overlook the needs of the inquiring mind and those with insatiable questing temperament. But there is no use raising eye brows and advancing reasons of tradition only. People feel different and think independently. We must keep up with the times and the best use of modern scientific advances because science is systematised knowledge. It is possible to achieve development in the improvement of our Talavadyas by applying relevant scientific technology and mechanism.

Karnatak music is enriched with varieties of Talavadyas with a fascinating rhythmic structure which can't be studied adequately in one life. A Talavadya, as all of you know very well functions, primarily, as an accompaniment in Indian and Western music. The finest of these percussive instrument is mridangam and probably the greatest contribution also. While western music has kept pace with modern technology by using latest raw materials to improve the range, tone and volume of percussive instruments, Indian instruments have remained more or less as before. The quality of the instruments must go up.

You all know that the pitch of a mridangam cannot exceed G or G-sharp or $6-6\frac{1}{2}$ kattai. I am particularly stressing this point because a high sruti for a female vocalist is a liability only for Karnatak singers where as in Hindustani style the tabla can be raised even to the eight pitch in the second octave. We are in an age when electronic srut boxes are taking the place of tamboora. And we have Micro-Computer Tala generators to have a periodic, steady time reference based on which a student can practice different rhythmic patterns. It involves lot of mechanical logic also. Now it is time for us to have a new look at our instruments. In the development and improvement of our old instruments the importance of raw materials are of serious consideration. The pitch of the mridangam is related to its length. The shorter the instrument the higher the pitch achieved. Yet, no sincere effort has been made in the direction of manufacturing a mridangam to suit higher pitch. And then the vagaries of the weather which affect the instruments are to be seriously considered by leather and wood research experts. Perhaps it is time we get the assistance of these experts to provide the required parameters of the wood required for the mridangam and plan for possible substitutes like fibre-glass and other synthetic materials, if any. The physicists are requested to help the artists and craftsmen to develop the contemporary manufacturing and maintenance devices of these instruments. In this connection we have to regret the paucity of good hereditary instrument makers.

What is the mechanism for tuning the mridangam? It is related to the tautness of the leather straps. The "naal" another drum in the north has a screw which enables one to raise easily the tautness. Can't something be done likewise for mridangam instead of beating every now and then. But before embarking on any new devices for improving the talavadyas one should have a highly developed musical sense. Mere mechanical or technical improvements do not give the desired effect.

I don't want to hold you long over this address and I thank all of you for your active participation in making this seminar a grand success.

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